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INTERNATIONAL

JUNE 1955

VOLUME 30 • NUMBER 6

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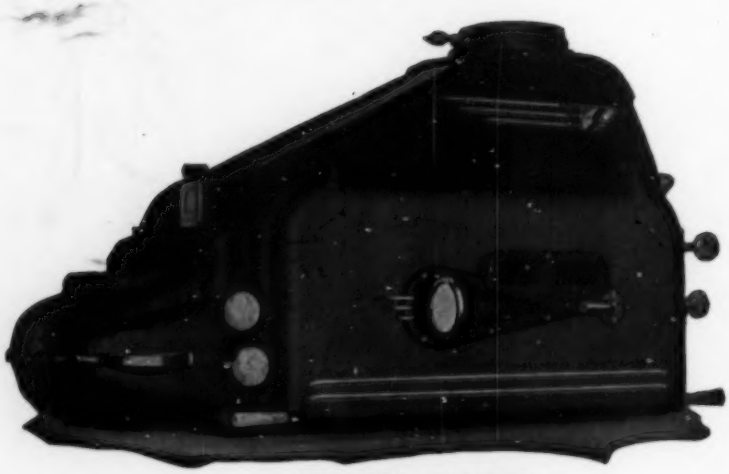

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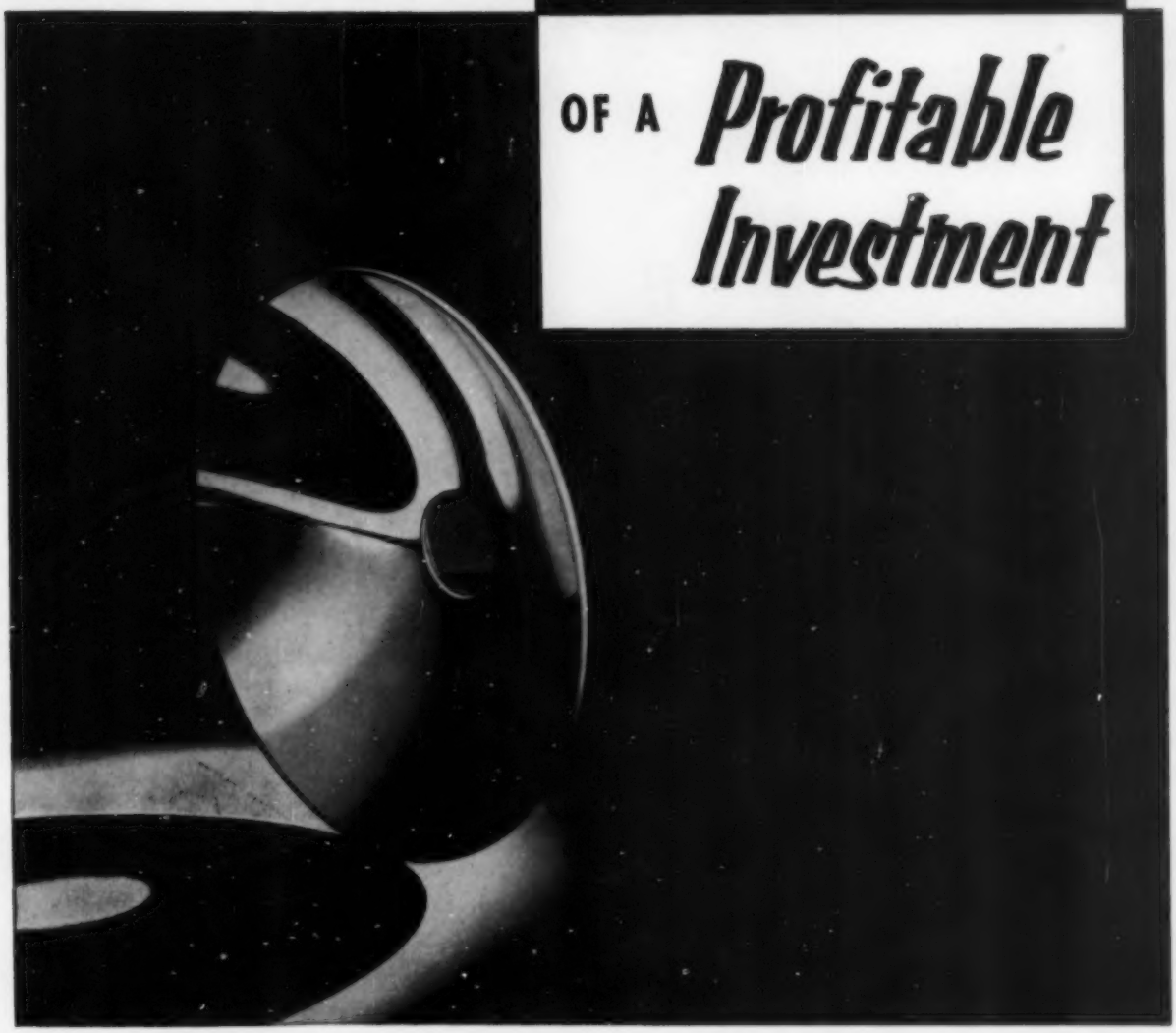

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INTERNATIONAL PROJECTIONIST

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Monthly Chat

THE theatre projection room, point of final delivery to the customer of the sum total of industry effort, today is but a dumping ground for a huge pile of junk in the form of equipment deemed necessary for the projection of product which in the main reflects only the personal preference of some psycho-producer in Hollywood, or similarly demented distribution executive, who thinks that mere bigness will compensate for their own mental deficiencies.

Typical IP stuff of always being "against" somebody or something, more than a few people will say of the preceding paragraph. And they'll be right, except that they will ignore the fact that much of this "agin" stuff has served to correct more than one deficiency in equipment and in procedure.

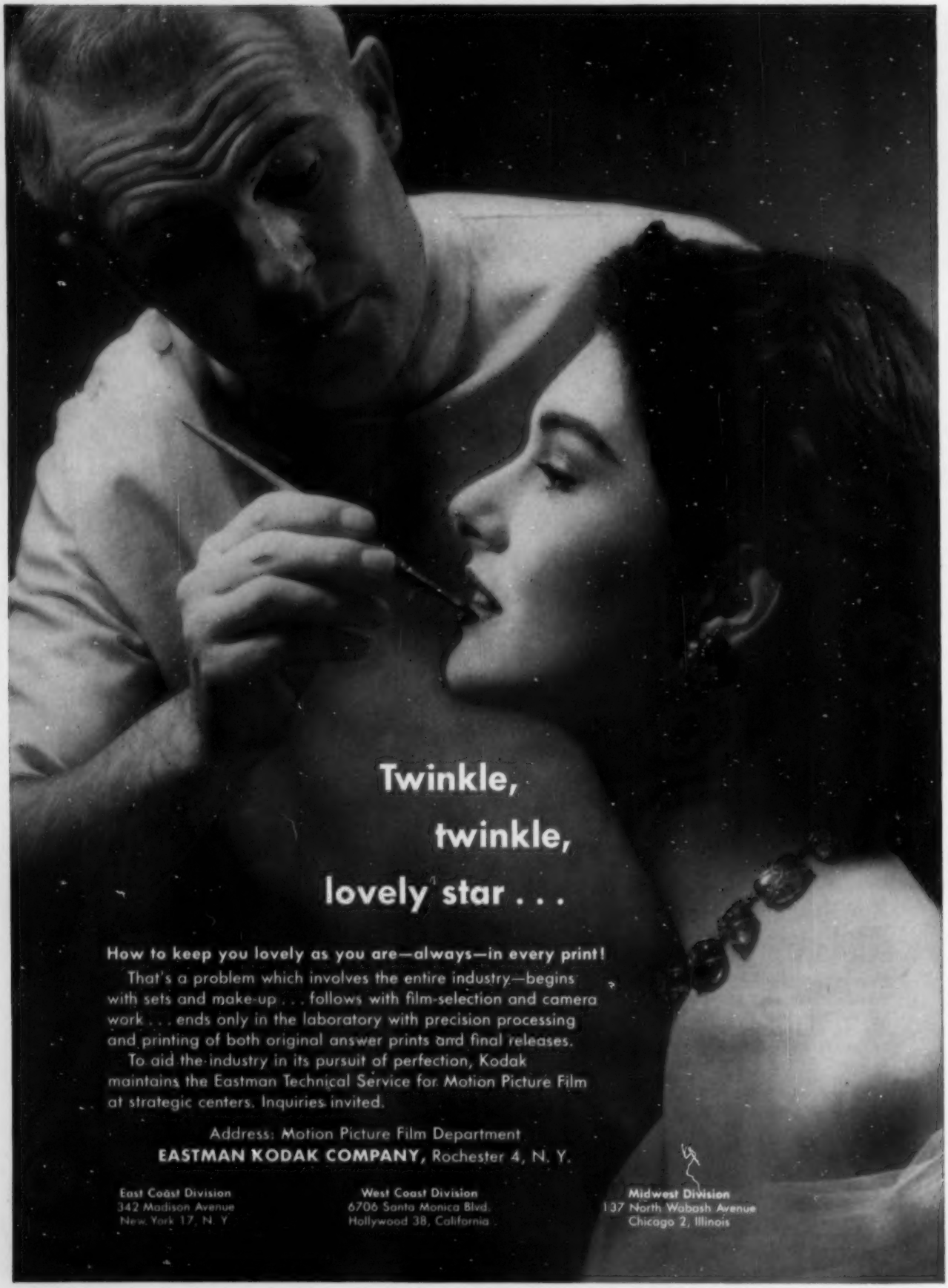
For more than a year now IP has sought strenuously but in vain to effect some means for the quick and positive identification of the myriad types of prints which rain down on the average projection room, which is the several-changes-a-week type of operation. The extended-run, main-stem fellows have no worries on this score because for the big dough represented thereby the distributors always extend preferential treatment in the matter of prints.

Everybody and his brother, and particularly those august technical societies with imposing names, agree that it's a wonderful idea and "something should be done." But nothing is ever done about it, despite the fact that IP's file on the topic bulges with pronouncements that an "announcement" will be forthcoming shortly.

"Announcement" about what and by whom? What is so extremely difficult about arranging a meeting in Hollywood of six or seven studio representatives and arriving at an agreement on a standard form of print identification. These guys can spend months arranging for a nation-wide broadcast of a soiree at which Oscars are awarded, but the very medium which carries the impress and conveys to the theatre screen these meritorious performances is not only neglected—it is ignored.

Some day these guys will wake up to the fact that it is the theatre dollar bill which permits their, on the whole, silly indulgences. We don't say that print identification is the most pressing problem facing the industry at the moment, but it is damned important to projectionists who are responsible for delivery in the best possible manner of the product which pumps the lubricant into and through the whole machinery. We're talking about the *money* that Hollywood merely dreams about.

TOLL-Tv requires a channel all its own, meaning a "pay" program and no other. Paramount Pictures (Telemeter) says it has "developed" a means for transmitting two signals on one channel. NOTE: It's not possible to have two signals *of the same quality* on one channel within, say, a radius of 150 miles equidistant. Two *weak* signals, yes, or one *strong* and one *weak* (common knowledge for 25 years), with neither combination applicable to *quality* transmission.


Twinkle,
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Prevention of Damage to Prints

By ROBERT A. MITCHELL

I. Inspection and Repair of Release Prints

NO MATTER how good the projection equipment may be, the results on the screen cannot be satisfactory if the film be defective or damaged. Print quality is not always as good as it should be, and complaints of "poor focus" are on the increase. Projectionists know that the picture on the screen cannot be clearer than the picture on the film. Scratches, torn perforations, and other forms of film damage also militate against good projection.

Film may be damaged in many ways. Some of the causes of print damage are beyond the projectionist's control; but we must face the fact that many injuries, some of them irreparable, are inflicted by improper handling in the projection room. And the term "improper handling" may be extended to include the use of worn and maladjusted projection equipment, thus mutilation of prints is not always the projectionist's fault.

Shipping Damage

It is usually easy to distinguish the effects of normal wear from the inevitable results of injudicious and careless treatment of film. Lack of adequate inspection of prints in the film exchanges, defective splices made by inexperienced examiners, and the continued use of bent reels and damaged shipping cases all contribute to film mutilation.

The projectionist has learned from experience to look for broken and torn edges on prints that arrive at the theatre in shipping cases so badly crushed that they have to be opened with the aid of a hammer, and the reels extracted with pliers. Boxes of film are sometimes handled rather roughly in railway stations, so it isn't surprising that the reels and cases get battered up after years of use. What really embitters the projectionist, however, is the refusal of many film exchanges to repair or replace "dished" shipping cases and "sprung" reels.

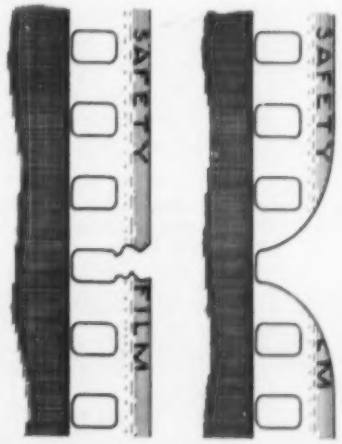


FIG. 1. Torn sprocket holes may be "notched" with the scissors to provide smooth passage of the film. Many authorities, however, disapprove of this practice. More than two consecutive torn perforations require that the film be cut and spliced.

Thus the projectionist's day often begins on a sour note, and his mood is bound to darken when inspection of the film reveals defects which should have been repaired by the exchange. He is forced to make the best of a bad situation, and only in the worst cases refuse absolutely to run the film. Exchanges are supposed to supply prints in runable condition; but the projectionist who projects film from the shipping reels without prior inspection usually finds himself in serious trouble.

Inspection Procedure

Film is inspected by allowing it to run between thumb and forefinger while rewinding it for the first time. The film is cupped only very gently during inspection, inasmuch as severe cupping may split the perforation margins or even crack the film down the middle if the print be dry and brittle. The whole idea is to hold the film lightly in such a way that splices and torn places can be detected when they pass through the fingers. Whatever procedure is followed, great care must be taken to avoid scratching the film.

Exchange "inspectresses" wear cotton gloves while inspecting prints, which may be one of the reasons so many defective splices apparently escape their attention. Most projectionists use their bare hands to locate defects which might cause film breaks and stripped gears in the projectors.

There are many defects to look for. Torn perforations and small nicks in the edges of the film demand attention. Rough and nicked edges may be corrected by trimming the edge of the

film with scissors, and tears extending from a sprocket hole to the edge of the film are sometimes remedied by "notching." Perforation breaks involving only one or two sprocket holes may be "notched," or smoothly cut out with scissors. When three or more perforations are damaged, it is best to cut the film and make a splice.

The secret of notching film successfully is to make a smooth, rounded cut-out. Poorly made notches may catch and tear on the upper guide roller, on the sprockets, or on the flanges of a reel. Certain competent authorities, in fact, condemn the practice of notching torn sprocket holes. The writer speaks only as a projectionist who occasionally notches film and has never had a film break from that cause.

Most projectors which have 32-tooth feed and holdback sprockets are capable of giving good results with film from which the perforation margin has been completely removed from one side of the film. The vast majority of projectors and soundheads used in American theatres make use of 16-tooth upper and lower sprockets, unfortunately. These small sprockets strain the perforations to a serious degree, especially when the reels fail to turn freely, and when small-hubbed reels are used.

This danger is minimized, so far as the upper feed sprocket is concerned, by the 24-tooth feed sprockets of the Simplex X-L projector.

As an alternative to either notching or splicing the film when torn perforations are found, a few projectionists go to the trouble of cementing a patch over the torn sprocket holes. The patch consists of a section of perforation margin cut from new stock from which the emulsion has been washed off. This expedient saves cutting the print, and is highly recommended for prized films from which the loss of even one or two frames would be undesirable.

Weak Splices a Tough Problem

Splices found in theatre-release prints are a frequent source of annoyance to the projectionist. Exchange-made splices are very good, as a rule, but they are sometimes too weak to be safely projected. Many of the defective splices are embossed with the exchange's initials or with the letters "OK."

The problem of weak splices may be traced to a fear of using an adequate quantity of film cement. Film experts have often cautioned against applying *too much* film cement, and this advice has frightened inexperienced exchange inspectresses into using *too little*. Too much cement may weaken the film at the edges of the splice, but too little results in a splice which comes apart at the slightest strain.

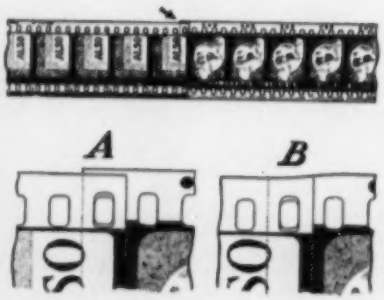
The strength of a splice in the perforation-margin area is the most important factor of all, yet many exchange-made splices have a tendency to "lift" at their ends. Too little cement applied to this region is one cause of the trouble; inadequate scraping of the film stub is another. It is sometimes possible for the projectionist to strengthen these splices sufficiently by dabbing film cement into them and pressing them with the fingers. But no amount of film cement will make a strong splice if the stub has not been scraped enough to remove the gelatine emulsion-coating!

It is admittedly possible to make strong splices by hand, but hand-made splices never pass through the projector as smoothly as a good "machine-made" splice. In a certain sense, however, all projection-room splices are "hand-made." The ordinary type of splicing block merely assists in the registration of the sprocket holes and insures the application of uniform pressure to the join while the film cement "sets."

Splicing Safety Film

The first and most important step in making a satisfactory film splice is the scraping of the stub. Not only must *all* emulsion be removed from the area of contact, but also the thin binder layer of clear gelatine. It is best to roughen slightly *both* contact areas — the scraped stub and the base side of the butt stub.

FIG. 2. When unshrunken film is spliced to shrunken film, the resultant rough edge should be trimmed smooth.



Most projectionists employ "wet scraping." The gelatine emulsion-coating is first moistened to facilitate removal, and the actual removing accomplished by scraping the stub with a razor blade. The trouble with this method is that it is difficult to get all the emulsion off in the perforation margins without tearing the film. Dry scraping with a medium grade of sandpaper gives better results if care is exercised not to scrape the stub too thin. It takes practice to know just when to stop scraping.

The dry-scraping method works best when the sandpaper is backed by a small wooden block to hold it flat and insure even scraping. Small scraping blocks with the sandpaper glued to them are readily available.

There is no discernible basis for the criticism that the use of sandpaper for dry-scraping film stubs leaves gritty particles which will injure projectors. Splices made by this method are wiped with a clean cloth like other splices, at once removing any dirt which may accidentally adhere to the film.

Every projectionist should make "1-hole" splices, with the stubs cut straight across. The ends of the stubs should never be mitered, for the greater the contact-area in the perforation margins, the better the splice will hold. "Hairline," or negative-type, splices should not be made in release prints unless a "hot-weld" splicing machine is used. Curved splices are tabu.

Cleanliness a 'Must'

To repeat, single-coated optical-track film requires scraping of the emulsion-coated stub cut one sprocket hole beyond the frameline. The base side of the butt stub (cut on the frameline) should be wiped free from oil or, preferably, slightly roughened to insure good solvent action of the film cement. The applicator brush should be large enough to enable a liberal quantity of cement to be applied to the stub in just one stroke.

No time should be lost between application of the cement and joining the stubs under firm, even pressure. The splice is permitted at least 10 seconds, and not more than 15 seconds, for the cement to set. Then the pres-

(Continued on page 37)

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What is (K°) Color Temperature?

FROM time to time IP readers encounter the terms "3400 K" or "5500 K" and probably wonder what is the significance of the expression "K". This terminology has induced many inquiries as to its application to motion picture work.

The term "K" stands for Kelvin, which is the standard scale of measurement of the color *quality* of light. In other words, "Kelvin degrees" would denote the "color temperature" of a light source.

The color content of a light beam is measured by a color temperature scale. Tungsten filament light, such as is used in a heavy proportion of studio floodlights and in 16-mm projector lamps, have a color temperature of about 3400 K. The light of a high-intensity arclamp is rated at about 5500 K. and is much more "white" to the eye than the yellowish tungsten light source. The light of the mid-day sun is rated at about 6100 K. Although mid-day sunlight actually has a slight bluish cast, it is the "whitest" of all known light sources. The high-intensity carbon arc is one of the few artificial light sources that come close to it.

Simple Definition: "Quality"

What, then, is "color temperature?"

Use of the word "temperature" in referring to this measurement for the *color quality* of light is apt to be confusing because one is not ordinarily disposed to associate "temperature" with "color". Actually, this relationship is easily understood.

If you were to take a poker and heat it over a flame until it began to glow and give off light, you would find that the light was a dark red. Heating the poker to a much higher temperature would cause it to give off a white rather than a red glow when the poker became "white hot."

Taking, Showing Light Balance

In short, then, "color temperature" refers to the color of the light governed by the intensity to which the light-emitting medium is heated.

Color-temperature standards have become increasingly important in calculations of studio technicians because of the mounting present-day emphasis on the use of color in pictures.

This color-temperature measurement gives an accurate indication of the special color quality of light—*provided*, of course, that comparative projection conditions be equal—arc-lamp, optical train, speed of lens, *etc.* If, for instance, the beam contains a predominance of light from the lower, or reddish, end of the spectrum, or from the higher-frequency blue waves at the other end, reasonably accurate readings are necessary. Special color-temperature meters are now available for such measurements.

It becomes immediately apparent that a proper balance, in terms of color temperature, be maintained between the taking (studio) and the projection light sources.

Color prints, whether they be Technicolor, Eastman Color, Ansco Color, or some other variety, should be "balanced" for projection with a high-intensity arc. The projectionist will have no problems in this regard if the

Aperture for RKO Superscope 2/1 Prints

NOW THAT the final decision (we hope) has been reached to adopt the 2/1 compression ratio in the *production* of all RKO "squeezed" prints for the so-called Superscope pictures, it is apparent that all anamorphic optics, both cylindrical and prismatic types with a fixed expansion ratio of 2/1, already in use for CinemaScope projection may also be used with the RKO Superscope releases.

Reduce Image Frame Width

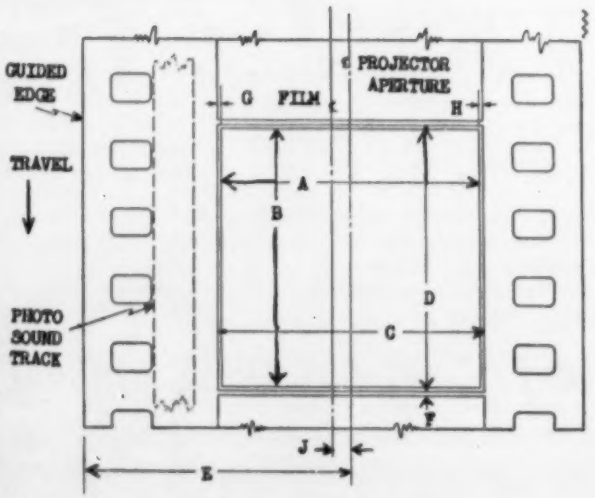
At first flush it would seem that RKO has gone over completely to the 20th-Fox camp—but RKO will retain a *projected* picture ratio of 2/1, as contrasted with the 20th-Fox 2.55/1 screen image. RKO was strongly tempted at first to adopt the 1½ compression ratio, but was deterred by the numerous CinemaScope installations world-wide. But in projection RKO stood fast for the 2/1 screen image.

One may ask how is this accomplished with a 2/1 "squeezed" image. The answer is simply that the *width* of the picture frame needs be cut—to an extent, in fact, where it is practically square. All that will be necessary in those theatres now equipped for CinemaScope (whether using fixed cylindrical or the variable anamorphic lenses) is a pair of new apertures plates cut to the appropriate dimensions and, of course, proper adjustment of the screen masking for the 2/1 screen image.

Included herein is a drawing supplied by the Research Council of the Academy of M. P. Arts & Sciences which gives the proper dimensions for the cutting of the aperture plate for RKO Superscope release prints with *optical, not* magnetic, sound-track and standard film perforations.

DIMENSIONS OF RKO 'SUPERSCOPE' PROJECTOR APERTURES

All figures in inches. A — 0.175 maximum; B — 0.175 maximum; C — 0.735 minimum; D — 0.735; E — 0.738 plus or minus 0.002; F — 0.013; G — 0.010; H — 0.010; J—0.049. The center lines of this and the standard 0.600 x 0.825 aperture are identical — that is, 0.738 from the guided edge.



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lamp arc-gap and reflector or condenser are adjusted properly.

The color temperature of the edge and center of the arc gas-ball and tail flame in an arclamp have somewht different color temperatures. This can be observed if the reflector mirror of the lamp be moved so that it focuses the *edge*, rather than the *center*, of the gas-ball on the aperture. The light will then take on a slightly yellowish tinge—no good for projection. This procedure changes the color-temperature of the arc setup—precisely what we are talking about.

Low-intensity lamps, now rare in theatres, are not suitable for presenting modern color motion pictures because the *yellowish* quality of their light distorts the inherent color-quality of the print as "shot" and processed.

The Term "Black Body"

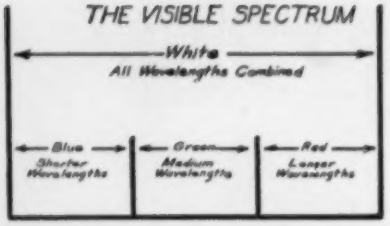
Another term, "black body," is associated with the Kelvin scale of measurement because of the difficulty in practice of obtaining a *true* temperature reading for the color quality of light, similar to that used for measuring the temperature of the aforementioned stove poker. The quality of light emitted by a red-hot or white-hot poker might differ slightly in character from the light emitted by some other object heated to the same degree. This difference would result from the ability of these objects to reflect extraneous light falling upon them, in addition to the light generated by the heat directly applied.

Therefore, the Kelvin scale provides a measurement for the color quality of a light source by matching this light to the light emitted by a perfectly black body when heated to a comparable degree. The black body cannot reflect light, thus its temperature may be used as an accurate gauge of the color of the light. The Kelvin scale measures temperature in degrees Centigrade from absolute zero, which is —273 degrees C.

Before the days of color photography, the motion picture industry was not much concerned with color temperature of a light-emitting source. Intensity of light, or the total number of lumens delivered from a light source, plus the exposure time required by the film, then in use, were the main interests of the cameramen.

Amber-Tinted Release Prints

In projection, the color temperature of the outmoded low-intensity arc



Diagrammatic representation of the color spectrum as sectionalized in wavelengths.

gave a yellowish glow to the screen with black-and-white films, but this did not concern unduly an industry that was then in the habit of adding an amber tint to the clear film base for a much stronger coloring of the screen image. Amber light, it was felt, made for a more pleasing picture.

Color pictures altered radically this situation. Basically, the cameraman faced the same problems as an amateur who wished to take "still" color snapshots. The amateur finds in the photo supply store two types of color film: one for use outdoors with sunlight, the other for use indoors with flashbulbs or photoflood lamps.

The reason why two types of color film are needed even by the amateur is the great difference between the color temperature of sunlight, (6100 Kelvin at mid-day) compared with approximately 3400 for the tungsten flash or photoflood bulb. Indoor film needs a strong blue-response in order to balance the excess of red in the artificial light source; while the outdoor film needs a relatively stronger response to red. It follows, then, that film balanced for use outdoors cannot give good results with artificial illumination unless some sort of specially colored flashbulb or filter is used to reduce the reddish quality of the light.

Studio Lighting Problems

The problem of matching color film to the light source for which it is balanced, when considered in relation to motion picture production, thus complicates an apparently simple problem. Consider, for example, an indoor color set:

A volume of light much greater than that required for black-and-white photography must be obtained and concentrated in a limited space. Both carbon arclamps and tungsten floodlights are frequently required to supply the desired level of illumination on various parts of the set. Tungsten lights, although effective, cannot supply the brilliant concentration of penetrating light needed for sharpness of detail—contrast values. But, because of the difference in color temperature, arcs and tungsten should not be mixed indiscriminately.

One solution is to lower the color temperature of the arcs by utilizing a pastel color filter. Then the light is right for color film *balanced* for tungsten. This procedure has the disadvantage, however, of lowering considerably the total *amount* of light emitted, in addition to altering radically the color temperature. Another solution is now being found in special low-color-temperature carbons designed so that studio arcs can be mixed with tungsten without filters (a recent National Carbon Co. development).

Expense-vs.-Cost Factor

An important aspect of the color-balancing problem with reference to arcs *vs.* tungsten is the expense-vs.-result factor. In a probably unjustified move a few years ago, producers switched from the use of arcs to tungsten because of the latter's vaunted economy of operation. Arcs were reserved for special situations, the cameraman being greatly limited thereby in the effects he could obtain. Probably, the new carbons mentioned previously will provide a technically effective and economical solution for color lighting problems.

When color film is used, the cameraman must be constantly on guard not only that the *volume* of light is great enough for the aperture of his lens, but he must be constantly assured that the *color quality* matches the sensitivity of the film being used.

The projectionist need only be sure that his high-intensity arclamp is functioning properly. If it is, the light produced is of exactly the color temperature to produce the best possible color rendition of the release print.

[Ed.'s Note: IP will present in an early issue, probably the next, the results of the painstaking research and exhaustive tests under actual studio conditions which crowned with success the search for a "hard-arc" (carbon) light source to complement the spectral characteristics of the "soft" (tungsten) studio light sources and thus make possible a better quality release print.]

Paramount Theatres 'Scope Cost

A total of $6,369,000 was spent by American Broadcasting-Paramount Theatres during the years 1953 and 1954 for complete CinemaScope and stereophonic sound installations in 260 of its theatres. Most of the circuit's 639 theatres now have wide screens.

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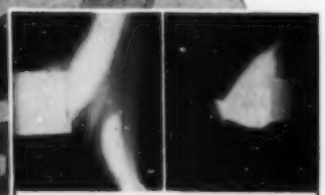
10mm x 20" "Hitex" Super H. I. Positive	L 0170
11mm x 20" H. I. Projector Positive	L 0109
13.6mm x 22" H. I. Projector Positive	L 0115
13.6mm x 22" "Hitex" Super H. I. Positive	L 0175



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STRONG ALSO MAKES TUBE TYPE RECTIFIERS FOR USE WITH ALL CARBON TRIMS

A Research Triumph: The Story of Black-and-White Film†

By C. E. KENNETH MEES

The steady improvement in the motion picture screen image over the past 50 years has to a large extent, been made possible by the successful efforts of the Eastman Kodak Co. and other companies to develop better negative and positive print films. The story of these efforts is appended.

THE PRODUCTION of motion pictures involves a combination of the theatrical art and photographic technique, and its history has depended upon the development both of the theater and of photography. I have been asked to give you an account of the development of the films used in making motion pictures, and in doing so I must call attention to the close relation between the methods used in the production of pictures and the nature of the films which have been available.

This account deals only with the films manufactured by the Eastman Kodak Co., a record of which was available to me. A number of other manufacturers have played an active part in the development of the industry and have made a variety of films. The Lumiere Co., of Lyons, France, made film at a very early date in connection with the development of motion pictures by Auguste and Louis Lumiere and later sold a considerable quantity of motion-picture film to American users.

Early Film Manufacturers

In 1918 the DuPont Co. commenced the manufacture of motion picture positive film and have since made a range of films for motion picture purposes. The Agfa-Ansco Co. manufactured motion picture positive film, and their successors, the Ansco Division of the General Aniline and Film Co., have been active in the supply of film to the industry.

This account of the development of motion picture films deals only with the films which produce monochrome, or black-and-white, images.

The beginning of motion picture production in the United States was associated with the first production of transparent film, made for use in Kodak cameras. In 1887, W. Dickson was working in Edison's laboratory in West Orange, N. J., on an instrument to be used with the Edison phonograph to reproduce motion as well as sound. In this instrument very small images were photographed in a continuous spiral on a cylinder, as sound is recorded on the phonograph cylinder.

In September 1889, Dickson sent an order and $2.50 to George Eastman for a roll of film 35-mm in width. This film was used in a new type of kinetoscope for taking motion pictures on a continuous strip of film which was standardized at a width of 1⅜ inches, with four perforations to a frame along both edges, the film which in essence is that used today.

Dual-Purpose Emulsion

The emulsion was that used in the Kodak cameras, and at first this film was used for making both negatives and prints, but in a very short time a special film was made for positive prints. It gave more contrasty and brighter prints and, being of lower speed than the camera film, it was easier to handle in printing.

In 1916 only two motion picture films were available—a negative film for use in the camera and a positive film for making prints. The negative film was sensitive to blue, violet and ultraviolet light, and it was necessary to expose it outdoors by daylight or in studios by the use of arclamps. Thus, motion picture studios found California, with its abundant sunshine, a convenient location, and a number of excellent lighting units using arclamps were developed, at first to supplement and later to replace sunlight.

In January 1917, a change was made in the basic emulsion of the negative film which was known simply as "motion-picture negative film" until, owing to the introduction of other films in August 1925, its name became Motion-Picture Negative Film Par Speed.

Print Identification Markings

As new films were introduced, it became necessary to use some identification for the type of film other than rather indefinite names, and the Eastman Kodak Co. adopted the practice of assigning type numbers to the films, using new numbers not only for new kinds of films but for new varieties of the same kind, the old type being continued on the market for the convenience of customers until it was effectively replaced by the new.

The type numbers constituted to some extent a code. Thus, 1 indicated a film on nitrate base; 2 in the second place indicated a negative film. Par Speed negative film was therefore assigned Type 1201, and its emulsion continued essentially unchanged until it was discontinued in July 1942.

Panchromatic Negative Film

As early as 1913, experiments were being made by Eastman on the production of a panchromatic negative film. The first panchromatic film was made for use in the Gaumont process, an additive procedure of color cinematography in which negatives were made simultaneously through three lenses equipped with suitable filters, and the pictures were projected in register by a three-lens system. This process was introduced by Leon Gaumont in France, and Mr. Eastman decided to consider its introduction upon the American market.

Gaumont made his panchromatic film by bathing negative film in dye solutions, but this process is very prone to give spots and other defects. Our experience with the Wratten panchromatic plates had shown that there was no great difficulty in sensitizing an emulsion to make it panchromatic. The real difficulties lay in the condi-

(Continued on page 36)

† Condensed from the "History of Professional Black-and-White Motion Picture Film," Journal of the SMPTE, Oct., 1954

Lester Isaac . . .

CINERAMA Caps Notable Career

CINERAMA is known to informed technicians in the audio-visual field as a "class" operation, and to the exceptionally well-informed and serious-thinking in this group it is "magnificence" itself. In conception, installation and utilization of intricate equipment and precise presentation, there has never been a standard of comparison for Cinerama.

The Cinerama process has been the topic of thousands of words in the public, trade and technical press; but the man who assumed and discharged brilliantly the tremendous responsibility for presenting Cinerama in flawless style to audience throughout the world has been mentioned, comparatively, only in passing.

Fitting it is that this man should be the subject of a personal niche in these pages, because he started with, and through more than 40 years has grown increasingly closer to, the projection craft.

This man is Lester B. Isaac, director of exhibition for Cinerama.

Cinerama Top Challenge

So challenging was the problem of introducing Cinerama to world audiences and thereafter maintaining its supremacy in the entertainment field, that Lester Isaac today states with obvious sincerity that he considers his whole life as a schooling for the task.

The trail to his present eminent position in show business started back in the early 1900's when he was a medical student, paying his way by working evenings in the then-popular nickolodeons. Like so many of his fellow craftsmen of today, he quickly succumbed to the lure of show business and became a member of IA Local 224, Washington.

Soon he was selected to manage the White House projection room, a service which he renderd through the administration of presidents Wilson, Harding and Coolidge. Simultaneously he conducted a motion picture supply business and also served as chief projectionist for Loew's theatres in the Washington area.

To Loew's Post in 1926

Then in 1926 he came abruptly to a fork in the trail: with sound pictures looming on the horizon, he was summoned to New York to assume the post of national director of visual and sound projection for Loew's, Inc. His contributions to the rapid growth and continuing refinement of this new form of entertainment were many and, in not a few instances, most significant — so much so that his name is today very well known world-wide.

Despite the exacting and often hectic demands of his Loew's duties, Isaac persisted in his determination to broaden his intellectual base. This resolve resulted in his winning an engineering degree, and in continuing intensive studies in sound and optics and in lighting and decoration.

Recognition of his many-faceted abilities came in the form of offers to "do" major Broadway productions; and probably his finest achievement in stagecraft was the supervision of one of New York's outstanding annual charity affairs, the "Night of Stars," which presented hundreds of the best performers, innumerable changes of lighting and staging, and was given at, of all places, the vast Yankee Stadium before an audience of more than 50,000 people.

'Borrowed' by O.S.S. During War

These manifold talents won almost instant recognition when the United States was plunged into World War II. Isaac was "borrowed" by General William ("Wild Bill") Donovan head of the famed Office of Strategic Services, to head up a special unit which would provide in graphic form data on the many phases of the war around the world to top directive personnel, including the late President Roosevelt.

Many types of film, along with weather charts, production graphs, maps and much other highly classified information were projected by special devices in a protected, soundproof room designed by Isaac.

During this period Isaac became acutely aware of and intensely interested in a really "new" development in his chosen field of endeavor — the multiple-projector system devised by the late Fred Waller to simulate on a vast panorama actual flying scenes so realistic as to provide Air Force personnel with an invaluable means for identifying various types of planes, friend or foe. This was an exhilarating experience for Isaac; but he himself did not know at the time how prophetic it was.

Another invaluable experience for Isaac during the war years was attendance at the very hush-hush and highly-demanding electronics school at Lexington, Mass., staffed by the best technical brains available.

Enter Cinerama--Greatest of All

Following his war service, Isaac returned to his post at Loew's, where he continued until Cinerama shattered the lassitude that had settled upon the motion picture exhibition field. On March 6, 1953, Isaac terminated his Loew's affiliation after 27 years of continuous service, —only to face the greatest challenge to his impressive store of knowledge in the many diverse branches of big-time show business—Cinerama.

How well this challenge was met is now a matter of history, and the contributor of several vital chapters to the chronicle was Lester Isaac. Geographically, Cinerama spans the earth: 14 major cities in the U.S.; two in Canada; London and Paris; two cities in Italy; two cities in Japan—these installations

(Continued on page 35)

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In The

SPOTLIGHT

The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.

FREQUENT references in this corner to the ravenous appetite of Tv for filmed program fare and the inevitable opportunity for greatly expanded employment opportunities for knowing film technicians were brought sharply into focus at the recent meeting of the National Ass'n of Tv Film Directors.

Motion picture film now accounts for approximately 55-60% of Tv presentation "air time" and is expected to increase materially in the next few years, stated T. Gentry Veal, of Kodak Research Labs. He added that "continued development in Tv apparatus has resulted in a gradual improvement until today it is difficult to distinguish the difference between 'live' studio pick-up and good film reproduction."

While there was much discussion at the meetings of improved Tv apparatus of a semi-automatic nature — such as the vidicon Tv tube, which has already rendered obsolete the iconoscope; the flying-spot kinescope for color Tv, and several models of continuous-type Tv film projectors — it was freely acknowledged that there would always exist a need for trained workers in the Tv art.

Projectionists would do well to keep themselves informed of such development in Tv so as to have at least a rudimentary working knowledge of the various processes.

• The recent 40th anniversary celebration of IA Local 568, Columbus, Ga., brought together for the first time in the Local's history the heads of both Labor and management. Richard F. Walsh, president of the IATSE, and E. D. Martin, head of Martin Theatres, Inc., one of the largest theatre chains in the Southeast, and president of the TOA, were the guests of honor at the celebration.

IA President Walsh addressed the assemblage, praising the fine relationship now existing between the labor-management groups in the industry and stating that "we have always been able to sit down and bargain without arguing." Mr. Martin endorsed Walsh's remarks, adding that he considered the members of the IA as the "core of the industry," and expressed the opinion that the progress of the entertainment field was due in large measure to the wonderful spirit of cooperation between labor and management.

Among the invited guests were Albert S. Johnstone, IA vice-president; Mayor E. C. Berry of Columbus; J. B. Pate, president, Georgia Federation of Labor; Charles K. Murphy, president, Columbus Central Labor Union; R. E. Martin, secretary-treasurer, Martin Theatres; and Emil Bernstecker, district manager, Wilby-Kincey Theatres. Present also were members of many nearby sister Locals.

A. B. Teel, president of Local 568, presided at the banquet.

• Friends of Charlie Muller, director of projection for the world-famous Radio City Music Hall in N. Y. City, will welcome the word that this internationally-known exponent of the "best" in projection presentations is making fine progress in physical repairment. The nerve-shattering effect of the stringent requirements of what is probably the most exacting projection job in the world, laid Charlie on the ropes temporarily (as they positively would after 23 years in such a post) and are being overcome gradually, with the most serious detriment to more rapid progress being a chafing-at-the-bit attitude on the part of this old warhorse to return to action on the showmanship track.

Charles Muller, director of projection at the world-famous Radio City Music Hall in N. Y. City

Those of us who wish Charlie only the best (and we are legion) can do him no greater favor than to drop him a line at either the Hall or at his home, 99-60 Sixty-Fourth Avenue, Forest Hills, N. Y. and tell him with kindly firmness to "take it easy, Bessie."

• H. M. ("Doc") Elliott, member of Local 173, Toronto, Canada, who visited the IP offices several times during his recent sojourn in New York, asks in a letter to the editor if the electronic viewfinder described in the video-film camera article in IP last month is applicable to "regular" cameras to the extent that it might improve the focus of motion pictures. The answer is "No"; this monitoring appendage to such a dual camera is for snooty directors and cameramen who wish to check instantly the many mistakes they make as they go along—as an economy measure, naturally.

• Pay-as-you-see Tv was the main topic of discussion at the recent New York State Association of Motion Picture Projectionists meeting in Albany, N. Y. James J. Brennan, 1st IA vice-president, advised the delegates to fight toll-Tv as

Assemblage at the recent 40th anniversary of the Columbus, Ga., Local Union 568 which marked the first formal social get-together of both management and labor in that area. The attendance at the affair of IA President Richard F. Walsh signalized this auspicious occasion.

a menace to the motion picture theatre, particularly to the small theatres in outlying districts. The Association voted to have all its member Locals send letters of protest against this form of Tv to the Federal Communications Commission in Washington, D. C.

Also discussed at this meeting was the operation of the New York State Compensation Board and what it means to the worker. Judge Nat Doragoff, member of N. Y. City Local 306, and a referee of the New York State Compensation Court, explained the functions of this Court and how the workers in the State are protected in the event of injuries incurred while on the job. Copies of Judge Doragoff's address were sent to all Local members of the Ass'n.

Other speakers included Paul D. Ries, A. B. West, Philip H. Freeman, and C. A. Lovgren, of National Carbon Co.; Arthur Meyer, International Projector Corp.; Wm. B. Spooner and George H. Walter, Lorraine Carbons; H. Paul Shay, secretary-treasurer for the 10th District; Ralph J. Mauro, National Theatre Supply branch manager; Anthony Boscarelli, vice-president, and Edward J. Doughterty, past-president, 25-30 Club, and William H. Ingram, service engineer for the Schine Theatres.

At the close of the meeting, the Association's delegates and guests attended a midnight banquet tendered by Albany Local 324 in celebration of its 41st anniversary. Dancing and entertainment, plus beautiful souvenirs, made the party one long to be remembered by all those present. Eddie Went, Bud Hill, Rocky Memole, and Frank Matthews were in charge of arrangements for the Albany Local.

• The welfare fund set up for the members of St. Louis Local 143 about a year ago was finally okayed by the Internal Revenue Bureau. The exhibitors will contribute 5% of projectionists' wages to this fund, and when $50,000 has been accumulated, members of the Local who have reached the age of 65 and have held membership in the Local for 25 years will be eligible for retirement and receive a monthly pension of $75. Retiring members with 15 years membership in the Local will receive a pension of $50 per month. Retirement is voluntary, and the Local pension will be in addition to social security benefits. Trustees of the fund are Robert Tomsen and Philip Murphy for Local 143, and Louis K. Ansell and James H. Arthur, for the exhibitors.

• A recent press release (Reuters) from Kiel, Germany, tells of the 16-year old boy who stole and so expertly dismantled a motion picture projector from a local movie house that the theatre manager refused to press charges against the thief lest the career of a "brilliant young technician" be ruined. When caught, the boy reassembled the projector without a hitch.

• While chatting with W. J. Courtney, secretary of Local 349, Lima, Ohio, during his visit to the offices of IP early this month, we were advised about the Local's new five-year contract recently concluded with the drive-in and downtown exhibitors. The new contract provides for a weekly increase of $3.00 for the first three years, and an additional $2.00 per week for the next two years; a work week of 36¾ hours, two-weeks vacation with pay, and time-and-a-half for overtime.

• Increases of from 14c to 21c per hour were granted to the projectionists working in the Odeon Theatres, under a contract concluded between the theatre circuit and Local 299, Winnipeg, Man., Canada.

• Twenty-five years ago: the IATSE held it 30th convention at the Alexandria Hotel in Los Angeles, Calif., the week beginning Monday, June 2, 1930. Do you remember?

Irving Merkur, projectionist-manufacturer and president of Ace Electric Mfg. Co., tendering his contribution to the Harry Sherman Heart Fund through the good offices of Ben Stern, treasurer of the 25-30 Club of N. Y. which sponsors the Fund.

Goobledegook on California Arbitration Award

IP Sustains Compound News Fracture

FALLIBILITY being the heritage of humans—editors and printers no less than manufacturers and projectionists—it is not surprising that in IP for April there appeared on the makeup for page 21 ("In the Spotlight") two items beginning with the phrase "The California . . .", one referring to a State Fair and Exposition, the other to an important judicial decision bearing on a contested arbitration award.

Seemingly playing no favorites with the Golden State, the compositor figured that any items relative thereto were concomitant, so to speak. In any event (and IP ducks no responsibility for this displacement of type matter) here is the story in toto of the arbitration award:

The California District Court of Appeals recently upheld an arbitration award denying the claims by Southside Theatres, Inc., of Los Angeles, that IA Local 150 violated its contract by demanding the employment of two projectionists for the showing of 3-D pictures. About a year ago Judge Praeger of the Superior Court handed down a ruling vacating the arbitration award originally granted in favor of the union.

In a unanimous opinion by the presiding justice, the Appellate Court reversed the Superior Court ruling and directed confirmation of the arbitration award. The upper Court upheld Local 150's contention that "the arbitrators acted within their powers in undertaking to make a determination as to the scope of the contract" and that the award in favor of the union "would leave it free to insist upon a new or supplemental agreement settling the 3-D picture dispute."

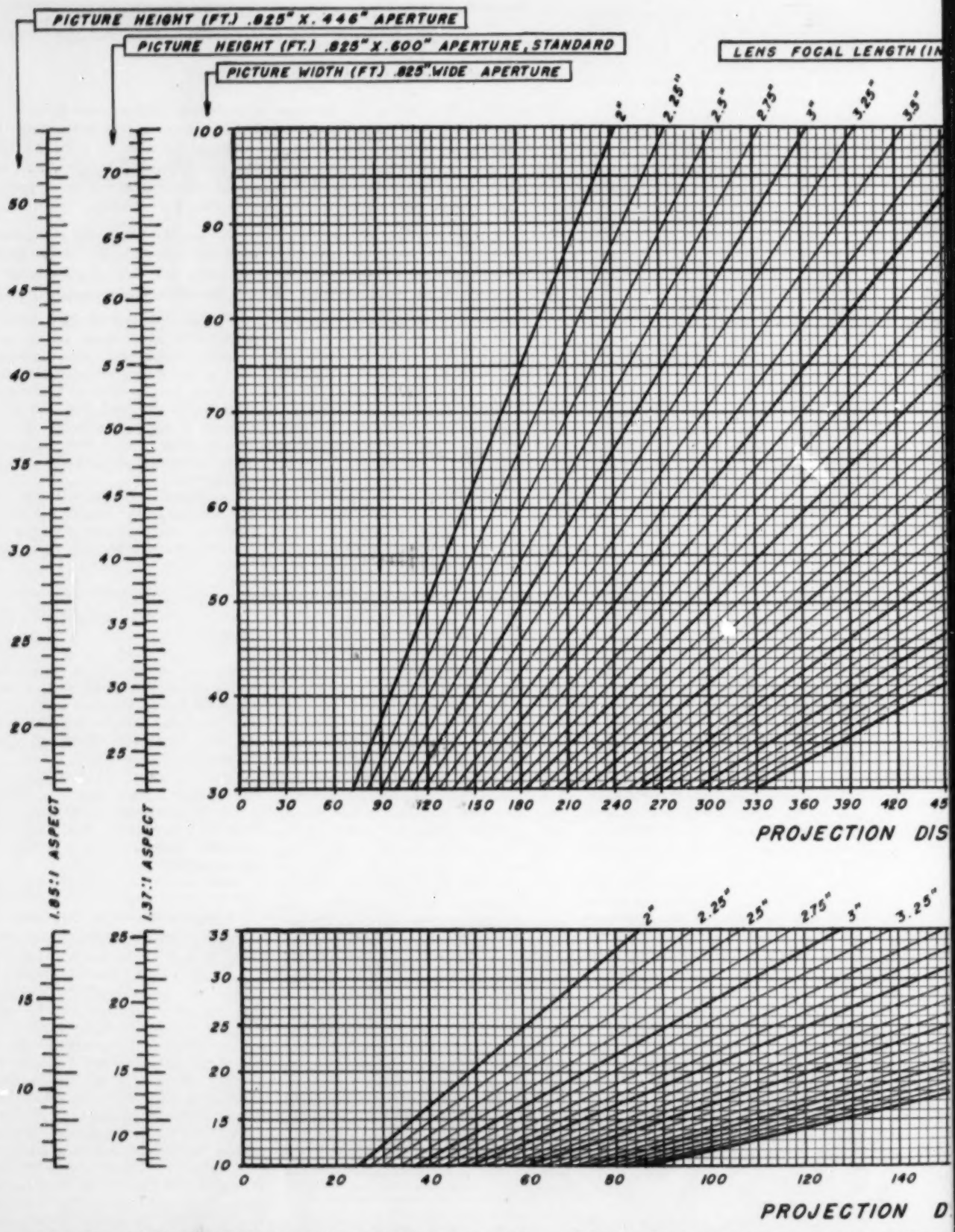
The Appellate Court declared that "the demand of the theatre was denied because it was determined that the *contract did not cover 3-D projection.*" That's that.

Closed-Circuit Tv Contract

Theatre Network Television has entered into a year's contract with the drug firm, Smith, Kline and French to handle all closed-circuit Tv programs that the latter firm sponsors for sales purposes. This is a departure from the usual method of arranging closed-circuit Tv programs and indicates the growing importance of this medium. Until now, such agreements had been on a single-program basis.

The TNT closed-circuit newtork utilizes theatre Tv equipment setup in theatres and hotel ballrooms in 36 cities throughout the country for business sessions. On several occasions the drug firm reached 23,000 doctors in 32 cities over this network.

KOLLMORGEN LENS-SCREEN SELECTOR CHA

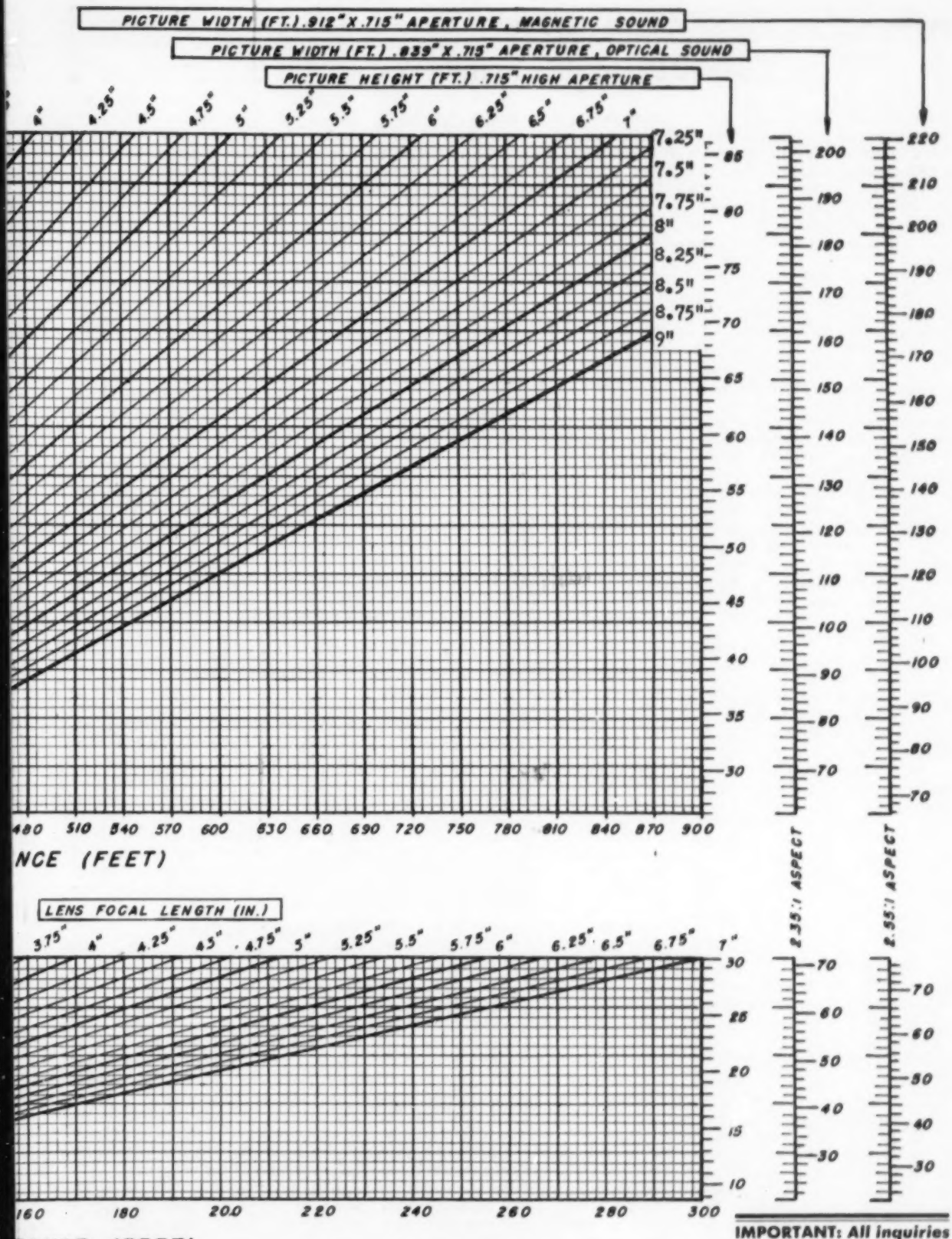


This chart is unique in that it is scaled not only for both magnetic and optical sound reproduction, but also for both the standard and wide-screen apertures—another IP "first"!

Here is a typical example of how best to apply this chart to an actual projection operating condition: with a standard aperture, you have a 4.25-inch (4¼) focal length lens and a projection "throw" of 360 feet. So, to find the correct picture width an only to enter the chart at the 360-feet projection and use the follow-up line to where it meets the 4.2 diagonal line.

Lay a ruler or straight-edge on the horizontal intersection and follow the line to the left-hand fi

T: Lens Focal Length, Picture Width and Height



ight, you need
nce ("throw")
ch focal length

ph line at this
es. There you will read off the following dimensions—a picture width of 70 feet and a comparable picture height of 51 feet.

For calculating wide-screen dimensions, use the table at the right-hand side of the chart. For picture widths of less than 35 feet, use the lower section of the chart.

IMPORTANT: All inquiries relative to this chart should be directed NOT to Kollmorgen but to IP at 19 West 44th St., New York, 36.

Low-Down on Silicone-Treated Cloth for Various Projection Room Uses

SILICONE-TREATED cloths represented as having a wide variety of useful applications in the projection field have been the topic of numerous letters received recently by IP, so much so that IP feels impelled to express its opinion as to the various uses of this product suggested by the manufacturers thereof.

IP has had tests made of such cloths on film, phonograph records, the film gates of projectors employing high-intensity arcs, and various other units found in projection rooms, in addition to the treatment of film under special conditions. These cloths cannot harm, nor help much, release prints unless too much moisture is applied to the cloth, and it may be useful to prevent, or at least minimize, the "sticking" of "green" prints. However, if the film is not wiped in a *continuous* manner, there appears to be a tendency for such cloth to leave an oily streak or mottle on the surface.

Under no circumstances, however, should silicone-treated cloth be used on raw stock or on negative or master-positive printing films.

Use on Lenses Prohibited

IMPORTANT TO PROJECTIONISTS: *The use of silicone cloth on camera or projection lenses is absolutely prohibited.* All lens manufacturers warn against such usage on coated lenses for the simple reason that a layer of silicone or any other kind of grease or oil interferes with the proper optical functioning of the magnesium fluoride anti-reflection coating. Such coatings are designed to work efficiently with glass on one side of them and air on the other.

The use of silicone cloth neither guards against the brittleness of film nor fading of the photographic image. The statement that the cloth adds "depth, brilliance to color or black-and-white film" is unfounded. Silicones are incapable of acting as intensifiers or reducers, though it may be assumed that the removal of dirt from the film improves the quality of the image. Photo filters should not be treated with silicones, especially if the filters are anti-reflection coated.

Not a Dust Resistant

A silicone coating on film or phonograph records does not prevent the collection of dust. In fact, dust adheres more readily to silicone-treated film than to clean, dry, unlubricated film. The film of silicones applied by the cloth is not "tough" but very similar to a film of ordinary grease or heavy oil. Silicones spread to a greater extent than ordinary greases, however, and feel "dry," rather than oily, because of their powerful moisture-repellent properties.

Probable Useful Application

A silicone film is removed more readily by film-cleaning liquids than is an oil film. Actually, the ease with which silicones are dissolved by hydrocarbon oils and greases render them very impermanent as movie-film coatings. In ordinary use, release prints come in contact with the oil used for lubricating projectors. The presence of oil removes the silicones with amazing rapidity.

It seems that the most useful appliion of the cloth lies in the direction of lubricating the sprocket-hole *edges* of green prints, waxed or unwaxed. A silicone coating on the film margins of new prints (emulsion-side only) would materially reduce the likelihood of "sticking" in the projection gate, and is superior to the use of ordinary oil because it would not "spot" the picture and soundtrack areas to an appreciable extent. Unfortunately, however, such cloths do not readily lend themselves to the coating of the perforation margins only. Some kind of simple applicator device would be a minimum requirement for this job.

Lubrication of gate runners and tension-pad surfaces with a silicone film may possibly be helpful when running green prints, especially unwaxed ones; but the silicones would undoubtedly vanish after the passage of 50 to 75 feet of film, and be removed almost instantly by only a few feet of oily film.—JAMES J. FINN.

So... You Project-Film Guys Have Worries?

Here are excerpts from a recent column by Dan Parker (our favorite sports writer) in the New York Daily Mirror. *So prophetic are these observations, conveyed in faultless journalese, and so apropos the present plight of Hollywood moguls who are torn betwixt and between the devil and the deep blue, that we couldn't resist sharing them with the relatively few who are blissfully unaware (for the moment) of Hollywood's prime interest.*

COMMISSIONER Ford Frick announces the engagement of a research bureau to survey all problems confronting baseball, obviously to find the cause of declining attendance. I would say this was a sheer waste of money; but since the Commissioner's coffers bulge with what it takes, the study can be put down as a harmless extravagance—*unless* it comes up with a report that the fans are for pay-as-you-see Tv.

Baseball, after all, isn't a religion or a way of life, as some people would have you believe. Nor should it be a medium for encouraging America to spend most of its time drawing up before a Tv set and opening a bottle, can or keg of Schmaltz's cool and refreshing beer with one hand, while lighting up an Unlucky, or a Black Vulture, with the other.

Strayed From "Basic Ideal"

The reason that surveys are now deemed necessary to find out what's wrong with baseball is that it has *strayed so far from its ideal.*

The Tv menace crept up on the money-hungry magnates while they were so blinded by its glitter that they couldn't foresee what they were doing to the minors by supplying competition *in territory they formerly couldn't invade.* What a mountain of woe they were building up for themselves when the "friend" that provided them with such great sideline revenue was developing into an octopus that was fastening its tentacles around them!

The game, meantime, has lost prestige through letting itself become a medium for tobacco and alcoholic beverage advertising that could have a bad effect on Young America.

Television has reduced boxing practically to a studio proposition controlled by one outfit. Now baseball seems to be plunging toward the same fate. With the minors decimated and the crop of young ballplayers diminishing annually, major league fans are drifting in droves to Tv too.

Booby-Trap in the Making

Now the magnates propose to bait the trap for themselves by turning to pay-to-see telecasts of their games. The next step would be empty parks, and that would bring baseball abreast of boxing in its plunge into oblivion. Having trained a generation of fans to get their baseball free on Tv, the magnates responsible for all this aren't going to get them to pay eagerly through the schnozzle attachment on the living room Tv for something they had been led to believe came with the set.

What Commissioner Frick should do is cancel that survey and hire a psychiatrist to listen to the wails of his harassed magnates, stretched out on the flat of their backs like the game itself, as they examine their guilty consciences.

The Ole Crank-Twister Considers 'Asback' Ratios

The second in a series of effusions, apparently meaningless but actually purposeful, by the self-appointed Dean of USA projectionists.

THIS is to officialy notify you and the industry that the way 'asback' ratio is being handled is all wrong. We, "The Society of the Star and Cam," have decided to change it all around. Our Society, as you should know, is fully qualified and authorized under our by-laws to put this over on the industry. Moreover, it is restricted to the high-intensity intellectual members of our L.U., and *gin*erally regarded as a sorta "Whose Who" to the profession. So, this removes no dout about the legality, and leaves even less dout about our standing — if able.

At a recent meeting of the Society, "Flicker" Toggelink, our chairman, was, as usual, maintaining proper parliementry decorus with a pair of 10-inch pliers. Incidently, Flicker is the invinter and mfg. of the famed "Dazzel-Lite" shutter (patent applied for). By the simple and ingenious expedient of hack-sawin off the anti-flicker blade of a two-wing shutter, he changes it into a one-winger. The increase in light output with the Dazzel-Lite is simply astonishin — being in the order of 50% gain over the soon to be obsolete ordinary two-winger.

'Prince' of Projectionists (Who Said That?)

But to get the main feature back on the screen. The principal speaker of the occasion—that Prince of Projectionists (the Ole Crank-Twister, of curse) was assisted (how else?) up the main isle by two of the *younger* members of our local, both 1914 men. Ole Twister began his revelations by expressing sincire regrets to the assembly for being unavoidably detained for 1 hour, 40 minutes beyond his scheddled time. Appears that he met an old friend at Marty's bar, because he had not seen this old pal since the days of Koster and Bials Music Hall, a nostalgic reunion had followed.

Resplendent in his emblem of "Fellowship" rank in the Society (a platinum-plated star and 2-pin cam taken from Edison's Exhibition Model Projectorscope) Old Twister read a paper, the title of which he insisted upon pronouncing as "Asback Ratios" (courtesy of Hollywood guys who never ran a projector). This quaint pronounciation was no doubt due to a little difficulty he was having with his artickulashun brought on by he-cups.

"Absolute" on the Level

It's just no use tryin to tell all Ole Twister said because he digressed at times from the prepared text into the realm of the penultimate projector and its relatunship to present-day phantasmagoria. Now, this subject is divisionist, since it tends to seperate the projectionist from the moving picture operator — so the less said about it the better.

The guts of the paper was to the effect that since all asback ration funkshuns are based on a "absolute horizontal throw," and since there ain't no such showshop anywhere, then the present system is un-reelistic. (Off the record, mind you—just for the novelty, and with no precunary motives, Ole Twister offered to work any such job as cheap as $750 per week, if one could be found outside the Hollywood studios).

Since, admittdly, there aint no such thing as a absolute horizontal "throw," then cropping of the aperature is as certin as a white screen when you forget to set the reel-end alarm. Moreover which verticle cropping is relatively twice that of horizontal. "The vertical demenshun," declared Ole Twister, "is and always has been the *variable*, and the horizontal the *fixed*." He concludes that "by making the horizontal demenshun equal to unity, aspect ratios cease to be Asback. Thus, 1.85/1 from now on is to be expressed as 1/0.54, and 1.75/1 becomes 1/0.572, *etc.*"

The Society, anticipating no sane opposition to the change, is confident that the shift to the new, and preferred, method will be adapted forthwit.

P.S. Flicker says that if you would put in a strong editorial plug for the Dazzle-Lite shutter, he would see what could be done about fixing you up with a contributing member ticket (finan-cial, of coarse).

FRANK W. MACDONALD
IA Local 199, Detroit, Michigan

New Hilux Lens Series by Projection Optics

The new Super Hilux lens manufactured by Projection Optics, Rochester, N. Y., is designated as having an "*F*:1 light-collecting speed," which term, the manufacturer points out, is not to be confused with the normal "focal length speed" of the lens.

Two years ago, the company states, it decided that a whole new concept of projection lenses was required, primarily because future requirements would involve projecting and transmitting light evenly over a screen size many times greater than that formerly used, and that color correction over such a size would become a most important issue.

"After careful review and intensive study of all known lens types," states Projection Optics, "we completed development of a new lens to be known as the Super Hilux 'F:1 Light-Collecting Speed'". We feel that this lens represents the optimum in color correction, flat field, definition, contrast and, most important of all, a means for getting considerably better light distribution.

"In the past, optical manufacturers throughout the world have used the *F* number to identify the free aperture opening of a given focal length. However, due to the limited technical knowledge of the public, such identification has been greatly misinterpreted as meaning a 'certain amount of light transmission'. This is not quite the truth, thus we chose a definition which actually can be used to measure a certain performance.

"Basically," continues P. O. Co., "by measuring the actual amount of light a lens can collect the trade now has a definite guide."

The Super Hilux is available in effective focal lengths from 1.5 to 7 inches in the 2 and 25/32-inch small diameter, and in effective focal lengths from 4.75 to 14 inches in the high-speed, 4-inch diameter mount. Focal lengths from 1.5 to 3 inches, and from 7 to 14 inches will be available only on custom orders. The remainder of these lenses will be carried in stock.

Hilux 264 Fixed Anamorphic

Most recently announced by Projection Optics is a new fixed anamorphic, the Hilux 264 lens for the smaller theatres which sells for $395 a pair.

This lens has the same optical features as the Hilux-Val, except that it is fixed and usable only with a 2 and 25/32-inch or smaller projection lens. The mounting portion has been designed to fit into any standard 2 and 25/32 projector mount, and will clear all accessories on the face of some projectors, the Company announced. It will thread directly on the prime lens, and will never require support brackets or extension tubes.

New PhotoStereo Sound System

Dr. John G. Frayne, chief recording engineer for Westrex Corp., and president of the SMPTE.

Simplicity of design and operation, reduction in equipment costs and complete compatibility mark the stereosound system which is described in the accompanying article.

STEREOPHONIC sound reproduction has been accurately defined as that which in the reproduction process maintains the same spatial relationship of the sound as it existed at the time of recording. This definition was the basis for a photostereo development recently demonstrated and described before the SMPTE by Dr. John Frayne, Engineering Manager for Westrex Corp.

This system was devised to overcome the problem of additional production, installation and equipment costs associated with the several stereophonic systems which were introduced during the past few years. A brief historical review of the development of stereophonic sound is given to clarify the definition of terms involved and provide a basis for comparing the relative merits of the various systems discussed.

Early Stereosound Efforts

We will recall that in 1943 Steinberg and Snow[1] showed that this type of sound reproduction could be achieved with the use of not more than two or three separate channels from microphones to loudspeakers.

As early as 1940, Bell Telephone Labs demonstrated a three-channel system employing three photographic sound tracks on separate film without picture, with highly gratifying results. However, it was not until some years later that the motion picture industry took active steps to incorporate this type of sound in their presentations.

Stereophonic sound, made in accordance with the foregoing definition, was first employed commercially so far as is known by Cinerama in 1952. In this application, five magnetic tracks on separate film were used to produce the stereophonic effect. Following the successful introduction of Cinerama, a three-channel stereophonic system on separate 35-mm film was used in the presentation of 3-D pictures in 1953.

However, since the motion picture studios lacked the time to develop techniques for stereophonic pickup, they usually resorted to the pan-potting of original monaural sound track to obtain the horizontal movement of dialogue across the stage; the result was a pseudo-stereophonic effect. In recording music, the stereophonic technique was employed in most instances.

First "True" StereoSound

The first commercial production using *true* stereophonic sound on the composite print for both dialogue and scoring, occurred in 1953 with the introduction of CinemaScope by 20th Century-Fox. Many pictures in CinemaScope have been produced subsequently by other motion picture studios, but in most cases the dialogue was obtained by pan-potting an original single monaural track.

To obtain the composite release print, four magnetic tracks were striped on the release picture print, and the sound was electrically transferred from a four-track master. Three of the tracks produce the stereophonic effect, while the fourth is used to provide auditorium sound effects.

The foregoing systems required special reproducing facilities in the projection room and backstage. In addition to the three or more separate transmission channels and loudspeakers which were common to all, Cinerama and 3-D used separate sound reproducers interlocked with the projection room equipment. To handle the CinemaScope composite print, a separate "penthouse" reproducer was mounted between the upper film magazine and the picture head. Suitable switching facilities permitted sound reproduction from either the CinemaScope or the standard release print.

Unfortunately, films made with these systems cannot be played in non-equipped theatres and accordingly they must be classed as non-compatible.

Perspecta's Compromise System

In an effort to provide a compromise of these conflicting conditions, Perspecta Sound was introduced in 1954. In this system a single monaural photographic sound track was employed, with three sub-audible frequencies superimposed thereon. These frequencies controlled the relative program level of the reproduced monaural sound into each of the three backstage speakers, thus making possible the movement of the sound across the screen.

This effect is similar to that obtained by the use of a pan-pot in CinemaScope and other systems. While it lessens production, installation and equipment costs, the fact that all of the sound must be moved at one time due to the single pickup, places it outside the definition of stereophonic sound. It affords no possibility of changing the *relative location* of sounds occurring *concurrently*.

At the present state of the motion picture art it is axiomatic that a system, to be compatible, must be photographic and the soundtrack must occupy the same position that is currently standard on the release print. The new track and the standard track must be capable of reproduction in a theatre which is specially equipped as well as in a non-equipped house with a minimum of operational changes.

Two-Channel Possibilities

While three-channel stereophonic systems are widely accepted in the industry today, one should not lose

[1] J. C. Steinberg and W. B. Snow, "Physical Factors", Bell System Technical Journal, Vol. XIII, p. 245, April 1934.

sight of the fact that as far back as 1934 Bell Labs scientists pointed out that somewhat comparable performance, particularly so far as angular location was concerned, could be achieved with a two-channel system.

This conclusion was based on the results of a series of carefully controlled experiments which are a matter of record[1]. A two-channel system with a center-bridged loudspeaker channel appeared to offer the maximum performance obtainable from two sound tracks.

In view of the potential possibilities of a two-channel system, it would appear unnecessary and undesirable to place more than two tracks in the space allocated to the single photographic sound track on the release print. The proposed PhotoStereo System was accordingly based on this arrangement. Either two 36-mil variable-area tracks with a 4-mil septum, or two 48-mil variable-density tracks with a 4-mil septum, are employed and are contained within the area allotted to the standard photographic release track.

The two tracks are recorded simultaneously in line and are reproduced in the same manner. Special light valves were developed to record either the two variable-area or variable-density sound tracks in line simultaneously.

Reproduction by New System

For reproduction with the PhotoStereo system, the usual optical system in the theatre reproducers is modified to be similar to that used in 100-mil push-pull systems. A relay lens is located beyond the film and it focuses the scanned areas of the soundtracks on a separator lens. This latter split-lens assembly separates the component light beams and also forms separate images of the exit pupil of the relay lens on the two cathodes of the photocell.

This optical arrangement results in the proper separation of the two tracks and also provides variable intensity of constant areas of light on the cathodes in accordance with the modulation on the tracks. This type of scanning is particularly desirable to minimize distortion during the reproduction of variable-area track.

Each cathode of the push-pull photocell is connected to a separate preamplifier. The outputs of the preamplifiers go through a dual fader and to separate power amplifiers and loudspeakers. The two loudspeakers are located symmetrically with respect to the center of the screen. This is a typical two-channel stereophonic system.

An alternate arrangement has come to be known as a 2½-channel stereophonic system. In it the outputs of the two pre-amplifiers are bridged to a third or "phantom" power amplifier and loudspeaker. The left and right channels are bridged into the center channel with a relative attenuation of 6 db, and with equal levels on the two sound tracks a good balance of auditory perspective is obtained.

Versatility of System

With either system, reproduction of a standard photographic soundtrack is obtained by diverting all of the transmitted light onto one of the cathodes of the push-pull photocell and transferring the output to the center channel in the case of the 2½-channel system, or to the 2 channels equally divided in the case of the 2-channel system. The optical and electrical transfer can be made as a combined operation.

Conversely, the PhotoStereo film can be played in an unequipped theatre with very acceptable quality and without introducing any changes in operating procedures. This would appear to eliminate the need for providing dual types of release prints. The relatively costly electrical transfer to obtain magnetic tracks as well as magnetic striping on the release print are replaced by the standard photographic printing process which is required in some form for the picture in any case.

It is not inconceivable therefore, that with its compatibility and economy features, PhotoStereo sound may become a useful adjunct to the more elaborate stereophonic systems in use in the motion picture industry.

New Single-Phase Selenium Rectifier by Strong

A new single-phase selenium plate rectifier which fulfills all the requirements for efficient operating projection arclamps burning 10- and 11-mm regular carbons and 10-mm Hitex carbons, has just been announced by The Strong Electric Corp. It was developed especially to fill the need of drive-in theatres which require the most powerful projection arclamps but to which three-phase current is not economically available.

This new rectifier incorporates all the proven features of other Strong selenium plate rectifiers, such as moisture-proof selenium units, remote control relay, airflow protective device, large fan ventilator, and taps to provide adjustment to compensate for supply voltage variations through a range of 10% above or 10% below the rated A.C. input voltage throughout the output rating range. The selenium rectifier stacks carry a three-year guarantee.

A new brochure on Strong's complete line of selenium plate and tube-type rectifiers for use with all carbon trims will be sent free to anyone addressing their request to Strong at 31 City Park Ave., Toledo 2, Ohio.

National Theatres Net Up

The consolidated net income of National Theaters' increased $82,665 for the quarter ended March 26 over the 1954 amount. The quarterly figure was $734,133 in contrast to $651,468 for a corresponding period in 1954. President Elmer C. Rhoden noted that the gross income for the half year was up four per cent but attendance sagged eight per cent. "The release of stronger attractions and the diminishing Tv audience in the summer provide an optimistic outlook," said Rhoden.

Columbia Pictures Profit Soars

Columbia Pictures showed an increase of $991,000 in net profit minus income taxes for the 39-week period ended March 26, 1955, compared to a similar span last year. The latest gain totalled $3,655,000 against a $2,664,000 mark for 1954. Earnings per share of common stock after preferred stock dividends jumped $1.25, from last year's $3.12 to $4.37 per share.

SMPTE Drive-in Survey

A survey conducted by the SMPTE of 26 drive-in theatres in Eastern and Midwest states found that the drive-ins could be equally divided between those having screens ranging in size from 40 to 60 feet and 60 to 120 feet. The average screen brightness was found to be 3.0 foot-lamberts, far below the indoor standard of 9 to 14 foot-lamberts. A report on the survey was made at the SMPTE's recent Chicago convention by Frederick J. Kolb, Jr., of Eastman Kodak. The report stressed the need for more projection light at drive-ins.

Belgian Theatre Fire

A fire that began behind the screen recently cost the lives of 49 people, 16 of them children, in a Belgian motion picture theatre.

Optical Terminology

A few simple terms which are invariably forgotten when the need to remember them is greatest. As published in "American Cinematographer," these terms are equally applicable to all forms of motion picture production.

By JOHN ARNOLD

Head of the Camera Dept., M-G-M Studios

THE ADVENT of the various wide-screen processes with their attendant changes in camera optics have reintroduced in many cases problems of resolution, depth of field, *etc.* While these still are puzzling terms to the average layman, they often are not fully understood even by some experienced cameramen.

The definitions and descriptions of such terms as "resolution" and "circle of confusion" are to be found in most technical volumes dealing with photography. Very often these books are not immediately available for reference when the need occurs. This suggests that condensed definitions of these important terms, memorized for ready reference, can prove beneficial to any technician dealing with cinematography. So, then:

DEPTH OF FIELD: The distance between the closest and the farthest points in a scene being photographed, which are considered sharp or in focus, is known as "depth of field"—a term, incidentally, often confused with "depth of focus." Obviously, only one plane—that on which we actually focus—can be considered as in true focus; but we must also establish a certain standard by which it is considered how far "off" this sharpest image can be and still be called "sharp."

Basic Rules for "Field"

We must bear in mind that the depth of field increases as (1) the subject distance increases; (2) the aperture of the lens decreases, or (3) the focal length of the lens decreases. To illustrate, the comparative depth of field of a 28-mm and a 50-mm lens operating at *F*:11 is shown in Fig. 1.

CIRCLES OF CONFUSION: This is perhaps one of the most difficult terms in optics to explain in simple language. When a lens is focused on a single pinpoint, that point registers as a sharp

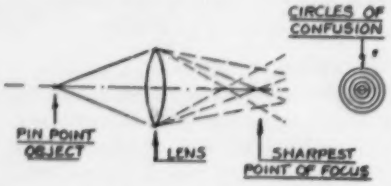


FIG. 2. The term "circles of confusion" is less confusing when illustrated in this manner. Rays of light projecting from point sources either nearer to or farther from the lens than the point focused upon cannot render a point image, but instead result in a circular image made by a cross-section of the cone of light rays, as shown here.

point. In actual practice, however, it is a small, sharply-defined disc.

In front and in back of this point there appear rather hazy, larger discs of light which make the "point" somewhat fuzzy in appearance (Fig. 2). This degree of fuzziness is known as "circles of confusion." The smaller the discs appear (the closer to an actual pinpoint), the smaller the circles of confusion.

There exists no *exact* measure as to what degree is acceptable, but this is a relative term used to compare optical correction and to measure "depth of field." It goes hand-in-hand with resolving power in this respect.

"Resolving Power" of a Lens

RESOLUTION: The term "resolution," more correctly termed "resolving power," means the ability of a lens to define images close to each other — sharply and distinctly. This means that a lens with a resolving power of 500 lines per inch will be able to reproduce sharply a drawing of 500 parallel lines each spaced an inch apart.

Getting back, for a moment, to depth of field, we know that the human eye cannot separate details which are in print closer than 1/100th of an inch apart (in a normal viewing distance of 10 inches). Therefore, we consider the "acceptable sharpness" in our field every line (of the aforementioned 500) which is perceptibly sharp and distinct from another line 1/100th of an inch or more distant.

Of course, to achieve this degree of sharpness in a print that is enlarged, let us say, seven times, we must have a lens which has a resolution of at least 700 lines to the inch. Obviously, therefore, we must think in terms of the normal amount of enlargement the lens image on the negative will undergo in order to determine an *acceptable* resolving power.

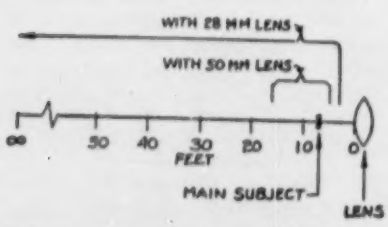


FIG. 1. Comparative depth of field of a 28-mm and a 50-mm lens operating at an aperture of F/11.

Projector Archivist -- One of Our Boys

RAY BRIAN is not a promoter for profit of things cinematic; he is not a Ph. D.; he is not engaged in either the production or distribution of motion pictures (which fact automatically attests to his sanity), and he does not contribute erudite (?) articles relating to cinematography to either the "arty" or the weekly hit-or-miss, mass-circulation periodicals. Nor is he the curator of a foundation-financed repository for cinematic memorablia.

World-Famous Collection

But Ray Brian enjoys personal compensation which, to him, far exceeds anything that might accrue to him through any of the aforementioned activities — an absorbing interest in the art of motion pictures, with special emphasis upon its spawning, its youth, and its venerable present. Not for Ray are the stars, the spangles and the hoopla attendant upon the making and showing of motion pictures today. He's interested in the projector mechanism.

Fitting indeed is this always avid interest in the mechanics of *showing* motion pictures, for Ray works daily in a projection room under the jurisdiction of IA Local Union 434, Peoria, Illinois. In his off-time he has indulged himself in what is truly a labor of love (which may be translated as non-profit) by amassing a collection of records, written and photographed and often buttressed by the actual machines themselves, of more than 350 projector mechanisms. "No," you say? Well stranger still is the fact that of these 350 projectors Ray has photographs of 212!

Craft Cooperation Sought

IP is proud to be the beneficiary of Ray's generosity in making available a catalog of these projector mechanisms which, beginning this month, will be published in a sequence of 25 each issue. Anybody anywhere in the world who wishes to lend a helping hand to Ray Brian in his richly deserved role as a motion picture historian of the first rank

will earn the gratitude of all of us, especially Ray.

Here is the first listing:

ACE—Sterling M. P. Machine Co., New York, about 1920.

ACME—Acme M. P. Machine Co., New York, which evolved into the Simplex-Acme.

ACMEGRAPH—by Jean A. LaRoy, 1906.

ACTOGRAPH—sub-standard 17.5-mm job.

A. E. G.—German make, 1928.

AGA-BALTIC—Sweden, 1950.

APEX—S. O. S. Cinema Supply, New York; of Simplex Regular design.

APOLLO—made before 1900.

AMERICAN—American M. P. Products Co., 1134 West Austin St., Chicago, Ill.

ALL-AMERICAN—by RCA in 1954 for export.

ANIMATOGRAPHE—Robert W. Paul's second mechanism, in 1896. Used a 7-point star.

ANARITHOMOSCOPE—before 1900.

ANIMASCOPE—made by Owen Eames about 1900.

ANIMATOSCOPE—made by Birt Acres in 1897; used extensively by Lyman Howe for his world-famous travelog lecture-demonstrations.

ARCADIO—British version of the German Mechau continuous projector which utilized a shutter wheel bearing 36 "matched" lenses.

ARTOGRAPH—made about 1900.

ASKANIA—made in Germany in 1950.

ATLAS—Atlas Educational Projector Co., 67 Irving Place, New York, about 1914.

BADGER—Badger Stereopticon and Picture Machine Co., La Crosse, Wis.

BADIZOGRAPH—about 1900.

BAIRD—made by C. R. Baird from 1914 through 1928 (British).

BAUER—made in Germany.

BEACON—made about 1920.

BEARD—R. R. Beard Co., England, in 1910.

BELL—Bell Equipment Co., New York, 1931.

[TO BE CONTINUED]

Changing Aspect Ratios

To The Editor of IP:

I receive a lot of valuable technical info from your articles, having read about the shifting devices used to move projectors when running magnetic or optical reproduction. These, to my mind, are unecessary when there is a much simpler way of remedying the situation.

I filed the top and bottom out from a pair of standard movietone apertures (1/37:1) to meet the Cinemascope height. With these apertures the picture projected is at a ratio of 2/35:1 instead of 2/55:1. They were already masked for a sound track, therefore, Cinemascope magnetic or optical can be run with this aperture.

To set projectors for a standard optical run (not C'Scope) insert the above-mentioned apertures with your C'Scope lens combination to determine how much, and where, filing should take place to meet the horizontal screen masking. Vertical screen masking must be moved due to the ratio change.

You will find the result well worth the effort.

R. C. KOLDOFF
I.A. Local 297, San Diego, Calif.

EDITOR'S REPLY: This solution to the problem of different aspect ratios when changing from CinemaScope magnetic- and optical-sound prints seems to be the most satisfactory way to eliminate masking and projector-centering difficulties. The difference between a ratio of 2.35/1 and a ratio of 2.55/1 is insignificant, although many projectionists feel that the full width offered by the magnetic-track prints should be employed.

Instead of an aspect ratio of 2.35/1, however, Mr. Koldoff is actually obtaining a ratio of 2.31/1 with standard apertures filed out in height. Very careful lateral centering of the aperture is necessary to prevent the narrow "effects" track on magnetic prints from infringing upon the picture area. This is the reason why the regular C'Scope optical-print apertures cannot be used with good results—they are too wide (0.839 inch instead of the standard 0.825 inch).

Du Pont "Cronar" Field Tests

To the Editor of IP:

The April issue of "International Projectionist" reported that the Du Pont Co., in cooperation with Paramount Pictures, was about to begin a field evaluation program of the new "Cronar" polyester photographic film base on *The Country Girl.*

This program is being carried out, and some of these reels now have been projected more than 200 times by various projectionists in a number of theatres. Almost without exception, the projectionists involved have been enthusiastic about the "Cronar" base, and also about the new transparent tape-splicing technique.

The Du Pont Co. reports that this evaluation program is proving of great value, not only in demonstrating the toughness and durability of the new base, but also in pointing up certain improvements which should and will be made prior to the commercialization of "Cronar" films. Du Pont also is happy to report 100% cooperation by all projectionists who have participated in this program, and expresses appreciation to these men for their suggestions and their enthusiasm.

E. MESCHTER
E. I. DU PONT DE NEMOURS & Co.,
Parlin, N. J.

COMPLETE cooperation with everybody having anything of value to offer for the advancement of the projection art has always been a hallmark of craft endeavor. IP is glad to have this basic principle restated by such a reputable organization.

Long Look Into the Future by Tv Trade Journal

Advertisers will spend $3.5 billion on television in 1965, and 65,000,000 sets—most of them resembling pictures hung on the wall—will be in American homes. Sixty per cent of the sets will be in color. Battery-powered, portable color sets, weighing five to ten pounds, will be as easy to carry as a briefcase. Circuits will be printed and tubeless. Sets will be repaired as easily as changing a light bulb. One thousand stations will be linked by three "live" Tv networks, and "tape" networks will be as common as today's radio transcriptions.

This prediction of the state of Tv a decade from now was made this month by *Television Digest*, a weekly periodical published in Washington, D. C.

Radio to Continue Strong

Radio was not ignored in the *Digest's* peek into the future. "U.S. radio homes today total 46,600,000, virtually 100% saturation. There are about 90,000,000 home sets and 30,000,000 auto sets. By 1965, with 58,000,000 homes, there ought to be at least 100,000,000 home and perhaps 50,000,000 auto sets. . . . Radio always will be with us — in home and workshop, in vehicles, in our pockets, on our wrists. And powered by tiny long-lasting batteries, it won't have to plug into wall outlets."

Also predicted was that moviegoing will be an "event" of the nature of "going to a Broadway play, the opera, championship fight, Kentucky Derby, *etc.*" If fee-Tv clicks, the *Digest* stated, neighborhood movie theaters will be wiped out.

New Drive-In Screen Paint

A new drive-in screen paint of the white "Vinylkote" type which can be applied in damp weather by either brush or spray on painted or unpainted surfaces is available from Raytone Screen Corp., Brooklyn, N. Y. One gallon covers 400 square feet, and the paint will dry in one hour, it is said.

An Ever-Changing Process: TV Studio Film Projection

Design of Tv projectors has diverged greatly during the last few years from the familiar mechanisms found in the theatre. This article describes equipment currently being used.

HOW DOES projection at a Tv station differ from that practiced in the theatre? This is a question often asked these days by theatre projectionists.

Tv projection is a constantly changing process. The arclamp, which was once an important part of the Tv film projection scheme, became outmoded by the development of highly-sensitive iconoscope camera tubes. The great majority of Tv films are presented today on 16-mm film by means of 1000-watt tungsten bulbs similar to those used in portable 16-mm projectors, or by means of a pulsating gas lamp similar to the Xenon arc which was described in IP for June, 1954.

Tungsten Light Dominant

Although there has been a trend during the last few years toward the pulsating gas lamp as a Tv projection light source, because its pulsations could be directly synchronized without a shutter to the scanning action of the Tv camera, this trend may now be reversing itself because it is felt that tungsten bulbs offer greater simplicity and economy of operation. By using tungsten bulbs, the complicated equipment required to provide the extremely high voltages needed for the arc-type gas lamp can be eliminated.

However, Tv projection is going through changes even more radical than this. Today, most projectionists and engineers in Tv are full of praise for the flying-spot scanner, a combined projection and camera device which makes it possible to eliminate intermittent action from the film and project a continuous image which is recorded by a photocell rather than by a camera tube. The flying-spot is felt to be the method of the future because it is not only highly efficient in terms of clarity of the transmitted image, but it is also adapted to the projection of color as well as black-and-white.

In a station such as WOR-TV, one of the smaller non-network stations in New York City, projection equipment includes two 35-mm projectors, two 16-mm projectors, one slide projector and one opaque projector. About 80% of all programs are transmitted from film. At CBS, where the New York station operates in conjunction with the master-control center of the entire CBS network, nine 35-mm projectors and nine 16-mm projectors operate along with a large number of slide and opaque projectors.

Small-Station Setup

The operations of these large New York stations are in contrast with that of a large number of smaller stations throughout the country where projection equipment is likely to consist of two 16-mm projectors, one iconoscope pickup camera and a slide projector. The camera, mounted in a chassis containing a preamplifier, is usually stationary, as are the projectors. The projection beam is directed at the pickup camera tube from either of the two projectors by means of surface-silvered mirrors set at angles. These mirrors can be installed so as to slide in and out of position on tracks, if necessary.

Usually, 35-mm projectors are found only in the major Tv stations. There are a number of reasons why 16-mm equipment is preferred in most installations. Building codes, for instance, still insist on much more stringent and expensive precautions against fire where 35-mm projectors are in use because of the possibility that nitrate-base film may be used.

The bulk and weight of 35-mm film is another cause for prejudice in Tv studios. Not only is it difficult and clumsy to store and ship, but 3000-foot reels must be used to hold the content of a 1½-hour program. 16-mm reels can accommodate any conceivable program length likely to be placed on film.

Because of these savings, most Tv projection is on 16-mm, despite the fact that engineers readily admit that 35-mm film gives much better definition and carries a soundtrack capable of reproducing sound with much greater fidelity. Many engineers feel that in years to come the advantages of 35-mm film will counterbalance the present economic reasons for largely ignoring it.

Projector Action Changed

Projectors used in Tv studios differ from those found in theatres in that their intermittent and shutter systems, when they have shutters, must be designed so as to send a larger number of separate film images per second to the pickup tube. In addition, the projector must be synchronized exactly

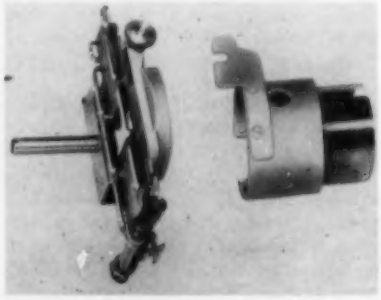
---

Wenzel Inner Light Shield

Wenzel Projector Co. has developed a new inner light shield, PRO-55, to be used in conjunction with the PRO-47 front lens focusing attachment for Wenzel PRO-4, Ballantyne "W," Simplex Regular and all regular rear-shutter projector mechanisms. When using the shield, the A-4 or the CW-65 lens mount (depending upon the situation) is removed entirely.

The inner ring slides over the lens barrel, and, regardless of the focal length of the lens being used, the film gate may be operated without interference. The slotted ear fits under the thumb screw on the EW-2, or the upper thumb screw of the E-45. It is made of brass and may easily be bent, if need be, to obtain proper lens alignment.

The EW-78 heavy-duty film-trap door shown here is the new Wenzel triple-tension-shoe type which can be used on any Wenzel or Ballantyne projector, since these mechanisms are already equipped with the Wenzel adjustable EW-2 door holder assembly. Other projectors using the E-45 door holder assembly with the two-threaded holding studs must obtain the Wenzel EW-2 with the single-threaded holding stud.



Wenzel inner light shield, PRO-55

with the waveform generator of the Tv camera which actuates the scanning beam of the camera's pickup tube.

At this point it is necessary to explain why more film images per second are needed and how they are obtained. Tv projectors are sometimes referred to as operating at a speed of "30 frames per second." This a confusing way of describing what occurs because the film does not run any faster through the projector. That would obviously mean that the action of the picture would be distorted, with actors appearing to be running when they were walking—to say nothing of what would happen to the sound.

Shutter Speed Increased

What does happen is this: The film actually moves through the projector at the standard speed of 24 frames per second—but the shutter action of the projector operates as fast as if the film were running through a theatre projector at a speed of 30 frames per second. This added speed is needed because Tv cameras and transmitters are timed to synchronize with 60-cycle A.C. current. Synchronization with the power supply frequency minimizes the effects of 60-cycle hum in the transmitted signal and simplifies the problem of setting up an exact timing relationship between the projector and the various transmitting components.

In theatre projection at 24 frames per second, 48 separate projected images appear on the screen during a one-second interval because the flicker blade of the shutter cuts off the image for about a third of the time that the film is held stationary in the aperture. Thus, each of the 24 frames provides two separate images to the screen for a total of 48.

In Tv projection, 12 additional images are obtained each second by making alternate frames of film provide three rather than two images. This results in a total of 60 Tv images compared to 48 for the theatre projector.

Unevenly-Gaited Intermittent

One method of obtaining the special projector action required for obtaining these 12 extra images per second is by means of an unevenly-gaited intermittent movement which moves each frame of film into the aperture for unequal periods of time—for 1/30 of a second and then 1/20 of a second alternately, rather than a steady 1/24

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of a second. By synchronizing this film movement, which is irregular in addition to being intermittent, to a faster shutter action, it is possible to obain a total of 60 separate film images per second.

The faster shutter action is timed not by a gear relationship to the intermittent pulldown action as occurs in theatre projectors, but to the waveform generator of the Tv camera which controls the electronic scanning beam that whips back and forth across the pickup mosaic of the camera tube.

Flicker Control

The question of flicker was also important in the choice of the 30-frame-per-second action for the Tv camera. Since the brightness level of the Tv home receiver is considerably higher than that of average motion picture screens (particularly in these days of giant wide screens) and since flicker becomes more noticeable as brightness increases, it follows that the 48-image cycle used in theatre projection might prove inadequate for Tv.

If necessary, Tv engineers could have relied on the light-storage or retaining qualities of the phosphors on the face of the Tv receiver tube to smooth over a slower cutoff cycle, but this would have resulted in some degradation of the image such as occurs when film is overdeveloped and an element of fogginess is introduced into a print.

Designing Tv receiving tubes that would hold the picture longer might have enabled Tv projection to operate at the same shutter speed as a theatre projector, but it would also cause the image on the phosphors to blur and lose definition. Therefore, it can be said that increased speed has a two-fold advantage. It brings the entire projector and camera system into sync with the power supply, and it also reduces flicker.

The Iconoscope Tube

There is, however, one problem that remains to be solved after the shutter of the Tv film projector is synchronized with the pickup camera tube and the film movement is controlled by the unevenly-gaited intermittent. Because the scanning beam of the camera tube records an image at regular intervals, with only the smallest fraction of a second between scanning periods, it must scan the face of the tube during the projector's pulldown when the light is cut off.

The problem is solved by the storage, or image-retention characteristics, of camera tubes such as the iconoscope. This camera tube, one of a variety that have been used in Tv cameras, is particularly adapted for film projection because its pickup surface, or mosaic, holds the light energy deposited by the projector. The scanning beam can pick up a signal even though there is no light hitting the mosaic at that instant.

An additional reason why 16-mm projectors became popular for Tv projection is that they can be synchronized with the camera system without use of the uneven intermittent movement, this because of the shorter pulldown cycle needed for the smaller film image. On many projectors it is possible to synchronize the shutter with the camera and obtain 60 images per second without altering the intermittent movement.

The Flying-Spot Scanner

The latest type of Tv film projector is the flying-spot scanner which is able to project color and requires no intermittent action at all on the part of the film. One of the basic principles of the flying-spot scanner is familiar to all projectionists, and another is known to many.

Roughly, the flying-spot scanner operates as follows: the light source is a small powerful cathode ray tube which projects its beam through continuously-moving film so that the image is recorded by a photocell. In some respects this process is not unlike what happens when film runs through the familiar optical soundhead of a theatre projector.

Another principle of the flying-spot scanner is more familiar in Europe than in America because it makes use of the principle of the Mechau non-intermittent projector, developed in Germany in the 1920's. This was the first technically feasible continuous projector.

Tilting-Action Mirrors

Projectors of this type are based on a complicated optical principle that makes it possible to project a continuous, uninterrupted image of the information contained on the separate film frames. The heart of this system is a large sprocket with a great many small mirrors positioned on its outer surface. These mirrors are tilted slightly as the sprocket moves in relationship to the film, with the result that they can continuously reflect a steady image of the moving film. The tilting action of the mirrors compensates for the motion of the film. As one mirror moves out of line with the optical system, another mirror takes over and reflects the next frame into the optical system, also compensating for the movement of the film by its tilting action.

The continuous projection system used in flying-spot scanners, such as

Research Labs Notes

Production of paper from synthetic fibers has been achieved for the first time. The new paper, said by the Du Pont Co. to be 3 to 10 times stronger than a product manufactured from the conventional pulp of rags, was made experimentally from nylon fiber, dacron polyester fiber, and orlon acrylic fiber.

• • •

"Like an oblong cake with white icing" is an apt description of a new cellular insulating block produced by Pittsburgh Corning Corp. The material, which combines insulation and ceramic finish, is made by placing two mixtures of finely pulverized glass and chemicals in a pan and baking them together. The result is a solidified block in which the white material has risen to the top.

• • •

New dual-grating spectograph is the first to operate with two gratings, enabling specimens to be photographed in two ranges simultaneously, according to Bausch & Lomb Optical Co. Two different spectral ranges gives the instrument a higher degree of speed and versatility.

• • •

Two-inch copper pipe capable of carrying many times the number of simultaneous telephone conversations now possible with coaxial cables, and at higher frequencies than have ever been used in communications, has been developed by Bell Telephone Labs. Called a circular waveguide, the tube can carry frequencies ranging from 35,000 to 75,000 megacycles, up to seven times higher than had been found practical before.

• • •

New lamp which provides Tv studio lighting technicians with more equipment flexibility has been designed by Westinghouse. New design details permit use of lamp in from "base down" to "horizontal" positions, thus removing limitations on placement of theatrical lighting units made necessary by previous models which could be burned in "base down" position only.

a model recently marketed by Philco Corp., embodies this principle, but the idea is simplified and made more practical through the use of prisms solidly joined to each other in a many-sided polygon. This polygon revolves in relation to the film in such a way that the image on one film frame is projected through the optical system by one of the polygon's sides. The film is partially wrapped around the polygon so that each film frame is optically and mechanically registered.

Even Light Level

The system operates in such a way that the light level of the projected image is always the same. As the polygon moves it compensates for the movement of the film, holding the projected image steady but allowing the light level of each frame to fade while the light level of the next frame builds.

In other words, two frames are projected at the same time. While one frame is fading out, another is fading in. The system works in such a way that the level of illumination never varies. If the light level of one frame is 25% of its peak, for instance, the light level of the frame moving in to position will be 75% of its peak. The total is always 100%. Therefore, no flicker and no abrupt transition takes place between each frame of film.

Perhaps the greatest advantage of the flying-spot is that it can be so readily adapted to the transmitting of color film. Conversion is simple: three photocells are used instead of one, and beam-splitting mirrors and filters divide the light into the three primary colors, one color being directed toward each photocell.

Light "in Reverse"

The most difficult aspect of the flying-spot scanner to understand at first is the fact that it works in reverse, so to speak. Instead of light being projected into a pickup tube, a light-emitting cathode-ray tube is used as the light source of the projection system. The light is projected backwards through the optical system, and the film image is recorded for transmission when the photocell registers the light from the scanning beam of the cathode tube after this light has passed through the film.

Something should be said before concluding about sound reproduction from film at Tv studios. It is most important that the widely-used 16-mm projectors have optical sound com-

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ponents of the highest quality so as not to further degrade sound recorded on the inherently-limited 16-mm soundtrack.

Tv sound signals are broadcast from a station to many thousands of different home Tv sets with greatly varying sound systems. The average inexpensive table-model Tv set with a 4-inch speaker tucked away in some odd corner of the cabinet is not made to reproduce high-quality sound. A small number of larger and more expensive models are capable of responding to a wide range of sound signals with great fidelity of tone.

Sound From Magnetic Tape

Although engineers realize the limitations of most home Tv receivers, they still make every effort to broadcast sound of the highest possible fidelity. At the New York CBS station, for instance, the sound for many programs is reproduced from a separate magnetic tape, run through a reproducer that is synchronized to the film projector by means of selsyn motors, as was done in some theatres for a short period a year or so ago.

With the exception of sound reproduction, it is easy to see that Tv projection equipment has changed so rapidly in a few short years that it is becoming difficult to trace the resemblance between it and familiar theatre mechanism. If and when the still-experimental system of recording the picture itself, as well as sound, on magnetic tape becomes a commercial reality, practically all resemblance will have disappeared.

PERSONAL NOTES

RALPH KAUTZKY has been named permanent division manager of Altec's northeastern division, with headquarters at 254 West 54 Street, N. Y. City. Kautzky stepped up from northeastern branch manager in October, 1954, succeeding S. PERKINS, advanced to operating manager of Altec.

Kautzky, a veteran employe of Altec and its predecessor, ERPI, has served in various capacities, including field engineer, field supervisor, and branch manager. A native of Bergen, Norway, he possesses an extensive electronics background acquired both here and abroad.

C. E. WARNER has joined the field engineering staff of Altec Service Corp. in the Virginia, Maryland, and Washington, D.C. area. Warner was formerly associated with Altec as field engineer in conjunction with the numerous CinemaScope-stereophonic installations the service organization made throughout 1953-54.

ARTHUR E. NEUMER of the Wollensak Optical Co., has been elected chairman of the Rochester Technical Section, Photographic Society of America, for the 1955-56 season. He heads a list of officers for next year that includes: vice-chairman, George T. Eaton, Kodak Research Labs; second vice-chairman, William S. Shoemaker, Rochester Institute of Technology; and recording secretary, Alton J. Parker, Kodak Park. James S. Moser, Kodak Park, will continue as executive secretary of the Rochester unit.

Color and its Measurement

Any color can be matched by some mixture of primary red, green, and blue lights, and the proportions required by observers of normal color vision serve as an internationally-recognized specification of the color. These proportions can be found indirectly by means of the spectrophotometer, the basic instrument for color measurement.

The automatic recording type of this instrument draws a curve for each part of the visible spectrum, showing the fraction of incident light reflected (or transmitted) by the color standard. The proportions can also be found directly from a photoelectric colorimeter calibrated by suitable color standards.

N.B.S. Comparitive Data

The National Bureau of Standards has now obtained fundamental physical data needed for the setting of color tolerances, the correct perception of color signals by both the normal and the partially color-blind eye, and the requirements for faithful color reproduction. Color standards, methods of color measurement, and systems of color designation have been developed.

Water-Cooled Carbon Contact for Strong '135' Lamp

A new water-cooled carbon contact assembly available as an optional feature on the Super "135" projection arc lamp, has just been announced by The Strong Electric Corp., Toledo, Ohio. The assembly is also adaptable to any Strong rotating-type carbon arc.

The announcement of this further development in the Super "135" comes upon the heels of several announcements covering a series of advancements made within the short period of less than two months. They included the adoption of 18-inch reflectors, a new long-life positive carbon contact, a removable holder for the heat filter, and forced ventilation of the reflector and reflector frame.

What Do You Know About Carbons?

The second of a series of questions and answers which explain the unique nature of carbon and describe how the substance is utilized so as to provide the brightest of all artificial light sources. Data provided by National Carbon Company.

Define the Term "Light"

The dictionary does a rather awkward job of defining light as "the opposite of darkness. . . . the essential of vision", *etc.* It is not until we get into the science of physics that an understandable picture is obtained.

Light belongs to the same family of radiations as sound, heat, radio, X-rays, *etc*: it is a particular form of the radiant energy capable of stimulating visual sensation in the human eye. The manner and form in which light travels through space is not clearly understood. It is known, however, that light is generated one tiny pulse at a time, each pulse the result of an *energy change* within a single atom.

An astronomical number of these tiny light pulses is required to illuminate an object to an easily visible level. Something more than 10 million billion (10×10^{15}) such pulses of white light per second, for instance, are required to provide the same illumination per square foot as a single candle at one-foot distance would provide.

How Does One Measure Light?

The measurement of light in motion picture projection applications is concerned with the specification not only of the *characteristics* of a source of light but also the illumination of an object by *light directed upon it from such a source.*

Relative to the source, interest is centered not alone in the *total* light produced, but in the *brightness* of the source as well. With an illuminated object, interest is in the light-per-unit area in the total quantity of light falling upon the object, and, particularly, in the case of the motion picture screen, in the *intensity* of the reflected light.

What is Meant by "Candlepower"?

The candlepower of a source is the light intensity expressed in "candles". Thus it is proper to state that a particular carbon arc has a "candlepower of 80,000 candles". Particularly with carbon arcs, which emit light in one hemisphere ahead of the crater, the light intensity (or "candlepower") varies with the direction of view toward the source.

It is therefore common to further specify the candlepower with respect to the direction, such as "horizontal candlepower," "axial candlepower," "forward candlepower," *etc.* Candlepower values may be specified for any direction or angle from which the light source is viewed.

"Candlepower," then, is the measure of the light-emitting *power* of the source, without regard to the *area* of the source. Obviously, two sources can be of the same candlepower even though one is much larger in area than the other—in which case the source with the smaller area is said to be the brighter of the two.

The "brightness" of a light source is therefore expressed in terms of *candles-per-unit-area.* The square millimeter (0.00155 square inch) has been chosen as the unit area for expressing the brightness values of carbon arcs. "Candlepower" and "brightness," therefore, are measures of the power of a source to radiate light; and if such measurements are taken in all directions, the source is completely specified.

Why the Term "Candle"?

The "candle" is the fundamental unit of light intensity and is a measure of the ability of a source to radiate light. A source is said to have an intensity of one candle if it be capable of illuminating an object at a particular distance to the same degree as would a standard candle.

The standard candle was originally defined in terms of the open flame of a 7/8-inch sperm candle burning at a specified rate. A group of carbon filament lamps preserved at the National Bureau of Standards (U.S.A.) is now used in place of the sperm candle as the standard units of comparison.

What, Then, is a "Foot-Candle"?

The "foot-candle" is a measure of the rate at which light pulses fall per-unit-area upon a surface. A surface of any area, all points of which are located at a distance of one foot from a source having an intensity of one candle, is said to have an illumination of one "foot-candle". The illumination in "foot-candles" multiplied by the area in square feet of the object illuminated gives the total "lumens" over that area. "Foot-candles" and "lumens" are the units commonly used to express values of the

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projected or incident light on motion picture screens.

What is the "Lumen"?

The "lumen" is a measure of the rate at which light pulses are emitted or received. Since a light pulse is so very small, it would be altogether impractical to relate a workable unit directly to a single pulse. To do so would be like attempting to buy a steak by the atom. A more practical unit (like the pound, for steak) is needed.

The "lumen" has been so chosen after the following fashion: if a source having a candlepower of one candle in all directions be completely enclosed at the center of a sphere of one-foot radius, and if a door of one-square-foot area on the spherical surface be then opened, light pulses will emerge at the rate of one "lumen". The lumen is thus a measure of light flow, just as in electrical units the ampere is a measure of the rate of current flow.

[TO BE CONTINUED]

Improved Projection Prints

Eastman Kodak has developed a new type of perforating machine for motion picture film that will permit a steadier image during film projection. Use of the new machine insures that a larger proportion of film will be more accurately perforated than was possible heretofore. This does not mean, Kodak states, that it is now possible to operate within narrower standards than in the past, but that a smaller proportion of the production will approach the outside tolerance limits. In other words, more of the production will be perforated to lower tolerances.

The shape and positioning of the sprocket holes remain as they have been in the past, and this improvement applies only to the matter of dimensional tolerances.

35-mm Projector Exports Rise

American manufacturers last year exported 1,026 35-mm motion picture projectors, compared with 878 during 1953, it is reported by the Department of Commerce. Exports of 16-mm sound projectors declined to 7,616 last year, compared with 7,700 in 1953.

New Paromel Projector Plant

The Paromel Electronics Corp. is now producing 35-mm motion picture projection equipment, formerly manufactured by the DeVry Corp., at a new plant located at 3956 West Belmont Ave., Chicago. Magnetic sound reproducing equipment is also included in the Paromel line.

Theaters' Best Reissue Bet

Theaters continue to hold a substantial edge over Tv in the cash returns for old movies. The latest indication of this trend was the third reissuing of "Wuthering Heights" which previously drew more money from movie houses than was proffered by Tv. The example set by "Heights" reveals that high-quality revivals always stand a good chance for success but a so-so rerun starts on a shaky foundation.

OBITUARIES

E. Perry Steinkopf, 61, member of Local 288, East St. Louis, Ill., and projectionist for the past 25 years at the Washington Theatre in Granite City, Ill., died last month. He is survived by his wife, a daughter, two sisters, and a brother.

Otto A. Hansen, 76, member of Local 343, Omaha, Nebr. for the past 50 years, died recently. Survivors are his wife, three sisters, and two brothers.

George A. Bee, 62, member since 1913 of Chicago Local 110, succumbed to a heart attack while at work in the projection room of the Midwest Theatre in that city. He is survived by his wife, and a son, who is also a member of the Local.

Joe Leavitt, 69, charter member of Cleveland Local 160, died last month. He worked for many years in the projection room of the Colony Theatre there. Two sons and four grandchildern survive him.

Frank Jiruska, 60, member of Local 191, Cedar Rapids, Iowa, died recently following a cerebral hemmorhage. A former official of the Local, Jirsuka worked in the projection room of the State Theatre in Cedar Rapids until the time of his death. He is survived by his wife and two sons.

Burton Steinhauser, 62, member of Local 373, Terre Haute, Ind., died May 15. A leader in union activities, Mr. Steinhauser served as business representative for Local 373 for 25 years. He was secretary of the Indiana State Association of IA Locals and for many years represented his Local at both District No. 8 and IA conventions. He leaves a son, daughter and a sister.

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LESTER ISAAC: CINERAMA

(Continued from page 16)

attest to the world-wide interest and acclaim accorded this enthralling cinematographic spectacle.

Bouquets as well as brickbats have accrued to Cinerama since its first showing in New York; but one can't laugh off the figures relative to even the first production, "This is Cinerama": attendance of 18 millions and a gross of $30 millions—in only 14 cities!

The road has been long and often arduous from the nickelodeon in Washington to the directorship of exhibition for the most famous audio-visual process ever known. But Isaac wears his present eminence well, and while he cherishes the many honors that have come his way he never flaunts them.

Still a member of Local 224 of Washington, Isaac today holds more than 50 gold life-membership cards in IA Locals. He belongs to a score of technical and fraternal organizations, but he has for the most part, as he puts it, "stuck to his people," his brother craftsmen.

Not 'Me' But 'Him' and 'That'

On a recent visit to his office at the Stanley Warner Management Corp., Isaac was heard to boast of only two things. One was that his son Hank, now 8 years old, was "a really good piano player" who one day was sure to give Rubenstein trouble. Then, pointing to the opposite wall, he said: "Please read that."

"That" was a framed excerpt from the Congressional Record for March 30 last. Under the heading "Cinerama Scores Diplomatic Victories in Near East," and referring to the giant Trade Fair at Damascus, Syria, it states:

> "Cinerama is a notable contribution to U. S. foreign policy. Despite the near-overwhelming efforts of the Soviet Union to dominate (the Fair) with massive displays and extravagant promises, both cultural and economic, Cinerama won hands down."

At a similar Fair held in Bangkok, Siam, the Russians, apprised of the inclusion of Cinerama on the program, promptly refused to participate on the ground that such showings constituted "unfair competition."

"That was the most satisfying reward of all," said Isaac.

Well said and well done, Lester Isaac, a credit to yourself and to the craft.

65-mm Prints from M-G-M

M-G-M announced this month that it is climbing on the big-film bandwagon and will release some of its forthcoming pictures on 65-mm as well as 35-mm prints. It is expected that Metro will utilize theatres where 65-mm Todd AO projection equipment has been installed for special "roadshow" runs of certain films.

exactly what meant by a "weak soap solution." In "hard-water" areas considerably more soap would have to be used than in "soft-water" areas. The soap must be removed with distilled water, or layers will form and become baked by the heat of the arclamp. The only possible way to remove such a deposit would be by volatile solvents.

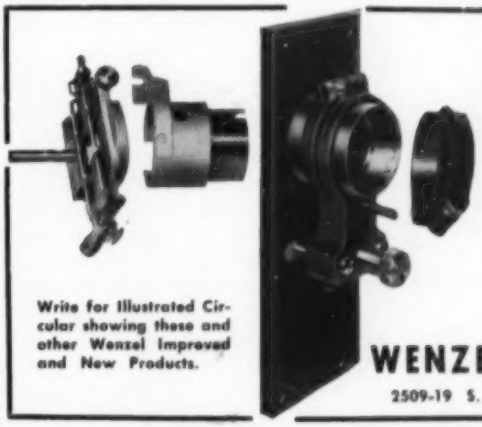
ing, the lens coating, especially on the recoating this element, cleaning, adjust-

The Metro system uses special cameras adapted for 65-mm motion picture film. Prints can be made by contact for the Todd AO projectors, or by reduction for CinemaScope and standard projection, thereby filling the needs of every theatre.

Circuits Against Wage-Hour Law

Employees of interstate theater circuits can expect a substantial delay before Congress acts toward including them under the expanding wage-hour law endorsed by the Eisenhower Administration. Exhibition groups are resisting the recommendation mainly on the grounds that interstate theater employees would have to be paid 1 ½-time for the weekend and holiday work when the theaters are busiest. Congress, which originally proposed the inclusion of the 2 million retail workers under the law, has now decided to make a "serious study" (?) of the plan.

A variable anamorphic attachment for 16-mm projectors is now being produced by Panavision, Inc., which also produces variable prismatic anamorphics for 35-mm projection. Distributor is Radiant Mfg. Corp., of Chicago.



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BLACK-AND-WHITE FILM

(Continued from page 15)

tions necessary for coating the emulsion. Much credit is due to the workmen and supervision who succeeded in coating the panchromatic film in those early days. The operatives were accustomed to red light in the coating rooms, and it was not easy to work in almost total darkness.

First Use of Panchromatic

Panchromatic film was originally supplied in small quantities as experimental material. Some of this was used as early as 1919 by Charles Rosher. In 1923 it became a regular product of the Eastman Kodak Co. One of the first, if not *the* first, regular productions made on panchromatic negative film was *The Headless Horseman.* The cameraman was Ned Van Buren. It was photographed in 1922, and the negative is now in the vaults of Eastman House in Rochester.

The first infra-red negative film was introduced under the name Panchromatic K in 1928 as Type 1210. Infra-red film renders blue skies as black, and green foliage as white, and is used chiefly for the simulation of night effects in pictures taken by sunlight. Very great improvements have been made from time to time in the sensitizing of infra-red film.

The use of panchromatic film became general in the studios by 1927, and tungsten light was being used to an increasing extent instead of arc-lamps, especially for supplementary lighting. In 1928 the Du Pont Company put panchromatic film on the market, and Eastman Kodak Co. introduced Cine Negative Panchromatic II, Type 1218, which was continued on the market until 1935. The year 1928 was, as we shall see later, one of great activity in the production of new types of motion picture films.

Sensitizing Dyes

At this point, it is necessary to say something of the development of sensitizing dyes. Up to 1928, the dyes used for photographic film were those which had been developed by E. Koenig and his colleagues and which had been introduced by the German dye company, Farbwerke Hoechst.

Starting in 1928, laboratories of photographic manufacturers in England, Germany and the United States began to produce new sensitizing dyes at a very rapid rate. A summary of the work in the Kodak laboratories alone can be given by saying that since the beginning of 1930 the sensitizer laboratory has on the average produced *one new sensitizing dye a day!* The use of these new dyes, and especially their use in combinations, made possible a great increase in the color sensitivity of photo material.

Further Improvements

In 1931 Super-Sensitive Cine Negative Panchromatic Film was introduced as Type 1217; it rapidly displaced the 1218 panchromatic film which had been the standard Eastman material for negative making in Hollywood. A faster film known as Type 1227 was made in 1935. This was named Super-X Panchromatic Negative Film. It had a new basic emulsion with ortho-panchromatic sensitizing. It had a comparatively short life, however, because in 1938 a group of new films were introduced characterized by appreciably higher speed and lower graininess.

These new films were made possible by basic developments in emulsion making which affected practically all high-speed films. The new motion-picture negative films were Type 1230, Background X Panchromatic; 1231, Plus-X Panchromatic, and 1232 Super-XX Panchromatic. Of these, Type 1231 quickly became the most popular motion-picture camera film made by the Eastman Kodak Co. It is currently in production and is still our largest-volume camera film. Type 1232 was similar to 1231, except that its emulsion was appreciably faster and coarser in grain. It was the fastest Kodak film made at that date and is still a current product, though the recently introduced Tri-X Negative Film Type 5233 will probably take its place.

[TO BE CONTINUED]

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Manpower Survey Postponed

Plans to aid the motion picture industry in curing the shortage of trained engineers and technicians have been postponed by the SMPTE, it was reported at the Society's Chicago convention. Technical leaders of the industry were said to be too preoccupied with the problems of their own companies to take part in a program which was to determine technical manpower needs and to suggest ways of meeting them.

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DAMAGE TO PRINTS

(Continued from page 8)

sure clamps of the splicing block are opened and the finished splice wiped laterally (*across* the film) with a clean cloth to remove excess cement.

A film splice is actually a *weld*, and a film cement is accordingly a *solvent for the film base*, rather than a mere glue. The two film surfaces dissolve to some extent and melt into each other. A solidly made splice should last for the life of the print, provided, of course, that the perforations are exactly registered and the edges of the film smoothed, if necessary, to prevent catching and tearing in the projector. It often happens that the width of new film is greater than that of old film; and the joining of dissimilar film-widths leaves a small protrusion at the edge of the splice.

A satisfactory splice cannot be made unless the film cement is fresh and the splicing block is in good condition. Film cement should be purchased in stock cans which can be tightly capped. The small bench bottle having an applicator-brush in the stopper is filled from the stock can whenever necessary. Cement absorbs moisture from the air and is eventually clouded by particles of dirt picked up by the brush. Dirty, cloudy cement should be discarded, and the bench bottle refilled with fresh cement.

Accurate Perforation Register

It is unfortunate that the usual type of splicing block is so difficult to adjust accurately. Not only must the perforations register in exact superposition, but the pressure applied to the join be even and sufficiently strong. The metal bar should be kept clean by wiping it with a small cloth moistened with film cement, followed by rubbing with a dry cloth. The bar should never be sandpapered or scraped with metal. Once its flatness is destroyed, strong splices cannot be made.

The pressure springs must be kept free from hardened cement and emulsion scrapings at all times, and properly spaced to insure satisfactory contact across the full length and width of the splice.

Splices in unmodulated, or "silent," portions of sound track may be silenced by painting a sine-wave "bloop" over them on the base side of the film with black movietone lacquer. Unblooped splices produce no discernible click or thump in the speakers, however, when the track contains loud sound at the splice.

Splicing Magnetic-Track Prints

CinemaScope magnetic-track prints require special attention in splicing because the magnetic sound tracks are applied to the base side of the film. The four tracks should be removed from the contact area to effect a strong splice. This may be done either by scraping both stubs (in the manner of double-coated color films) or by applying film cement to the tracks and quickly wiping them off before attempting to make a splice.

Complete removal of CinemaScope magnetic tracks is very important because no film splice can be considered safe unless it holds solidly in the perforation margins. Tracks of this type cannot be satisfactorily blooped to avoid a noise in the speakers when the splice passes over the magnetic pickup head. The smaller sprocket holes of CinemaScope magnetic-track prints require a special splicing block having correspondingly smaller film-registration pins.

Leaders and Cues

Leaders and cue-marks should be carefully checked in every reel of film because the professional smoothness of the presentation depends to a large extent on accurately-timed changeovers. Every precaution should be taken to avoid unwinding the film on the floor when checking leaders and cues. The top of the rewind bench should be kept free from dust and gritty particles which work their way into rolls of film and scratch the emulsion. Short horizontal scratches which mar the picture and create

Neumade's 16-35 mm Catalog

Reflecting the many new developments in the theatrical and Tv field, a new catalog which includes scores of new 35-mm items added to the line in the past two years has just been issued by Neumade Products Corp. This job is the most comprehensive summary available relating to equipment for the storage, filing, shipping, editing and handling motion picture film of all types.

Catalog is available without charge from Neumade at 250 West 57th St., New York City 19.

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for want of sound, the show was lost
for want of a show, CLOSED the audience was lost
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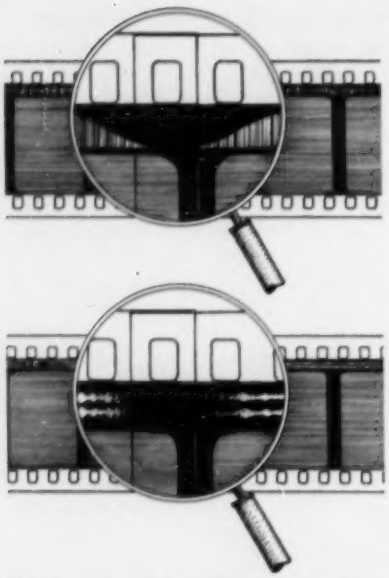

FIG. 3. "Blooping" the sound track at splices to avoid clicks or thumps in the sound. The top drawing illustrates the sine-wave bloop painted in Movietone lacquer over splices in variable-intensity sound tracks. Below is shown the air-brush type of bloop preferred for variable-area tracks.

crackling noises in the sound are usually caused by dirt particles picked up from the rewind bench.

Splices in leaders should be checked for misframes and the insertion of excessively long lengths of replacement film. Loss of footage in the leader only results in the omission of a few seconds of action and speech, and is usually unnoticed by the audience. But a leader which is too long may result in a momentary blackout on the screen when the changeover is made. It frequently happens that replacement leaders contain more than 3 feet of film between the frame marked "3" and the beginning of the picture.

The motor and changeover cues originally printed on the film usually have adequate visibility. It is only very rarely necessary to "score" these cues — that is, to outline the black dots to make them show up on the screen more conspicuously. Hand-scoring never gives neat results, so a regular cue-scoring device such as the Ace or the Signo must be considered as a projection-room necessity.

Common Mutilation Marks

Film is often mutilated by conspicuous scratches, cross-marks, and punched holes intended to serve as cues. When the last 15 feet or so of a reel are spattered with these make-shift cues, it is difficult to know which ones to use.

Loss of footage in the last 12 or 13 feet of a standard release print requires replacement of the original cues with new ones, even though this is properly the exchange's job. Any old cues which may remain must be painted out with movietone lacquer.

Beginning at the end of the film, there should be at least 3 feet of dense black film following the last frame of the picture. Opaque film is preferred to clear film for this runout because a black screen looks better than a white screen should the changeover be missed.

Between the last frame of the picture and the first of the four changeover cue-marks, there should be 22 frames (16½ inches). From the first of the 4 frames having the changeover cue to the first of the 4 frames having the motor-start cue, there should be 11 feet of film, allowing a little over 7 seconds between the appearance of the two sets of cues on the screen.

These distances should be checked whenever a splice is discovered in this portion of a print. If the original cues have not previously been replaced by someone, new cue-marks should be scored on the film with a cue-marking device, placing a cue in the upper right-hand corner of each of 4 consecutive frames. The old cues (as well as any scratches and cross-marks which may be found) should be concealed insofar as possible by carefully painting them out with black movietone ink applied to the base side. Holes punched in the film are concealed by cementing tiny patches cut from black film over them.

Curtain Closing Speed

It is advisable to regulate the travelling speed of the title curtain so that from 6 to 6½ seconds elapse from the time that the curtain-motor switch is thrown to the time that the curtain closes in front of the screen. This timing permits use of the motor cue as a curtain cue. If a longer interval is needed for the curtain to close, an additional curtain cue will have to be placed on the film at the proper distance from the changeover cue on the last reel of film subjects.

A *black* china-marking crayon should be used for marking special cues, as the red ones smear on oily film. These cues should be wiped off with a clean cloth after the last showing of the film. Don't leave this job to the next fellow—he may miss these special cues when inspecting the film and become confused when they appear on his screen.

[TO BE CONTINUED]

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Actually, good luck of that sort was a rarity to Peary. Enduring intense hardships, he had failed six times before to reach the Pole, but he never gave up. He lived all his life by his personal motto: *I shall find a way or make one.*

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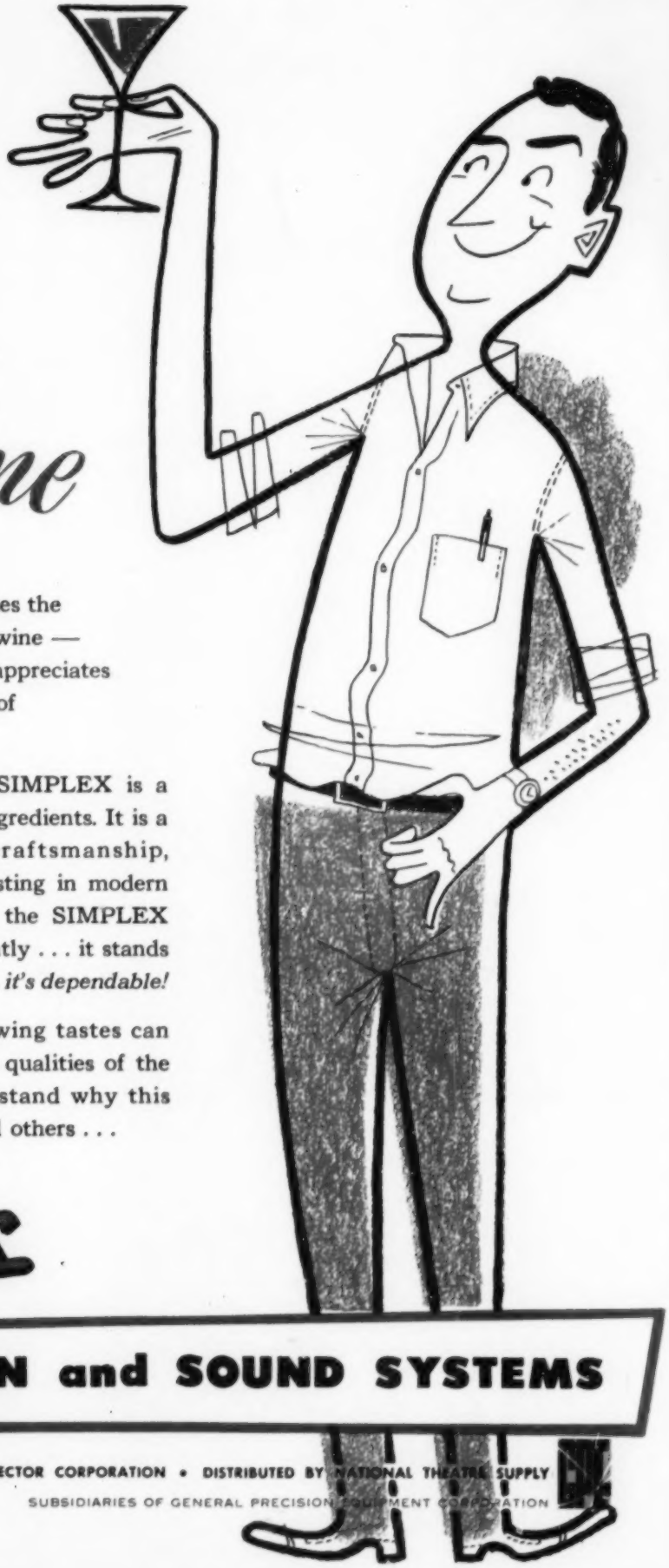

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